EXHIBIT A

US007311276B2

(12) **United States Patent**
Matlin et al.

(10) **Patent No.: US 7,311,276 B2**
(45) **Date of Patent: Dec. 25, 2007**

(54) **SHREDDER WITH PROXIMITY SENSING SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 17 days.

(21) Appl. No.: **10/937,304**

(22) Filed: **Sep. 10, 2004**

(65) **Prior Publication Data**

US 2006/0054724 A1 Mar. 16, 2006

(51) **Int. Cl.**
A01F 21/00 (2006.01)
B02C 23/00 (2006.01)
B23Q 11/00 (2006.01)

(52) **U.S. Cl.** **241/37.5**; 241/236

(58) **Field of Classification Search** 241/37.5, 241/236

See application file for complete search history.

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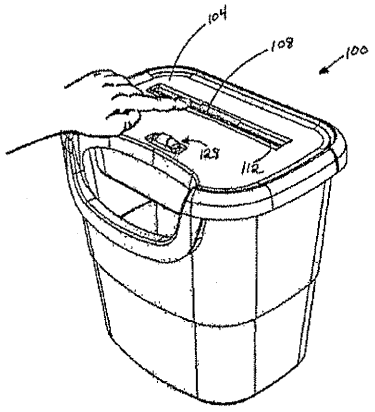
(74) *Attorney, Agent, or Firm*—Pillsbury Winthrop Shaw Pittman LLP

(57) **ABSTRACT**

The present invention relates to a shredder that includes a proximity sensing system to sense the presence of a person, animal, or object near cutting elements of the shredder.

114 Claims, 9 Drawing Sheets



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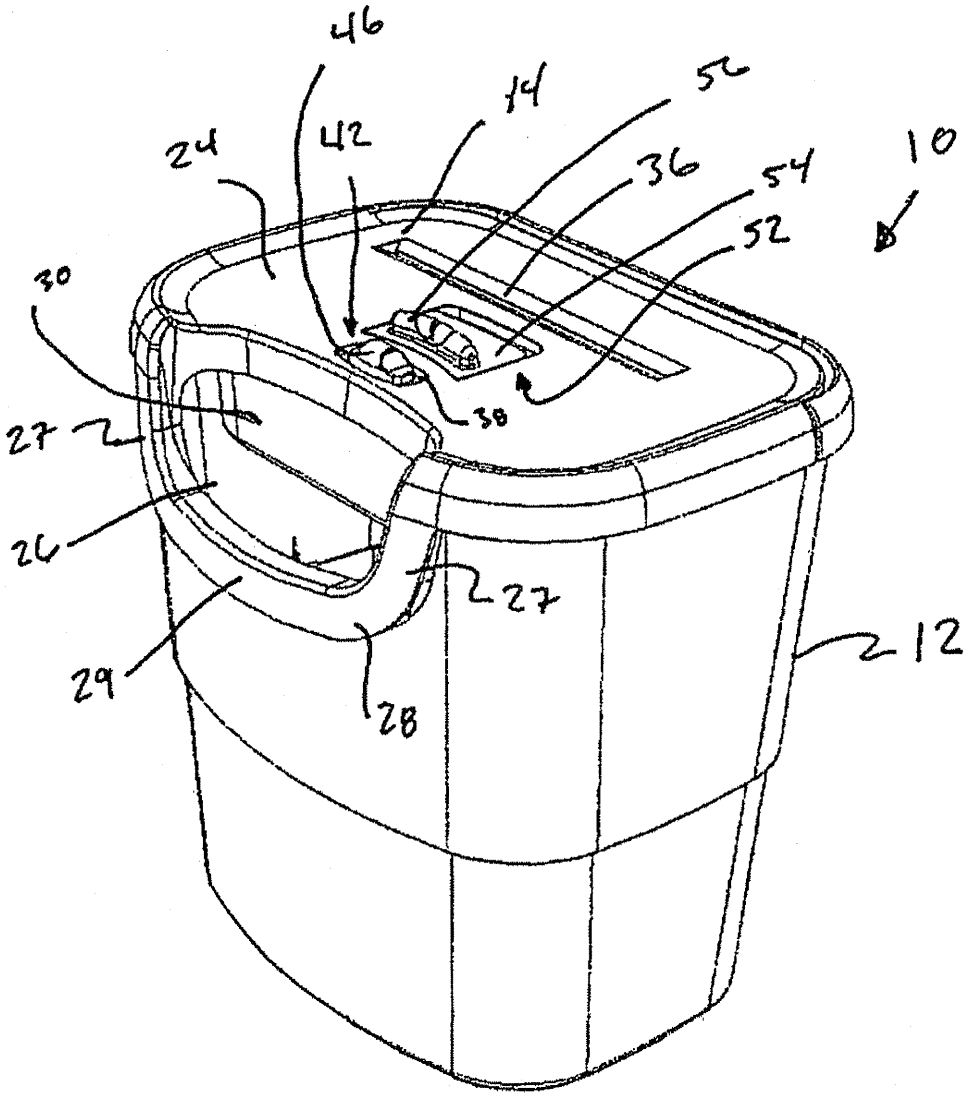
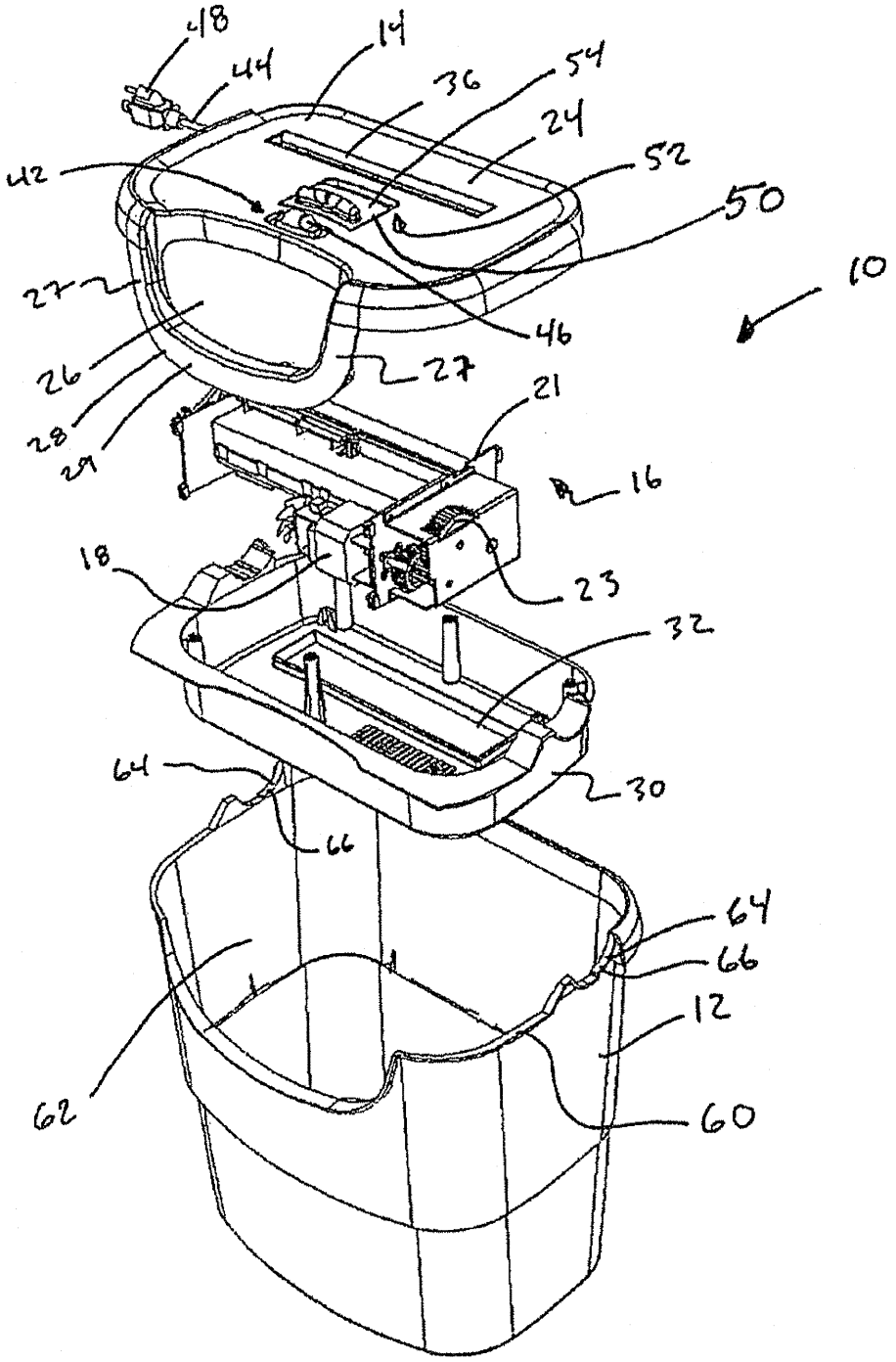


FIG. 1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32
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64
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FIG. 2

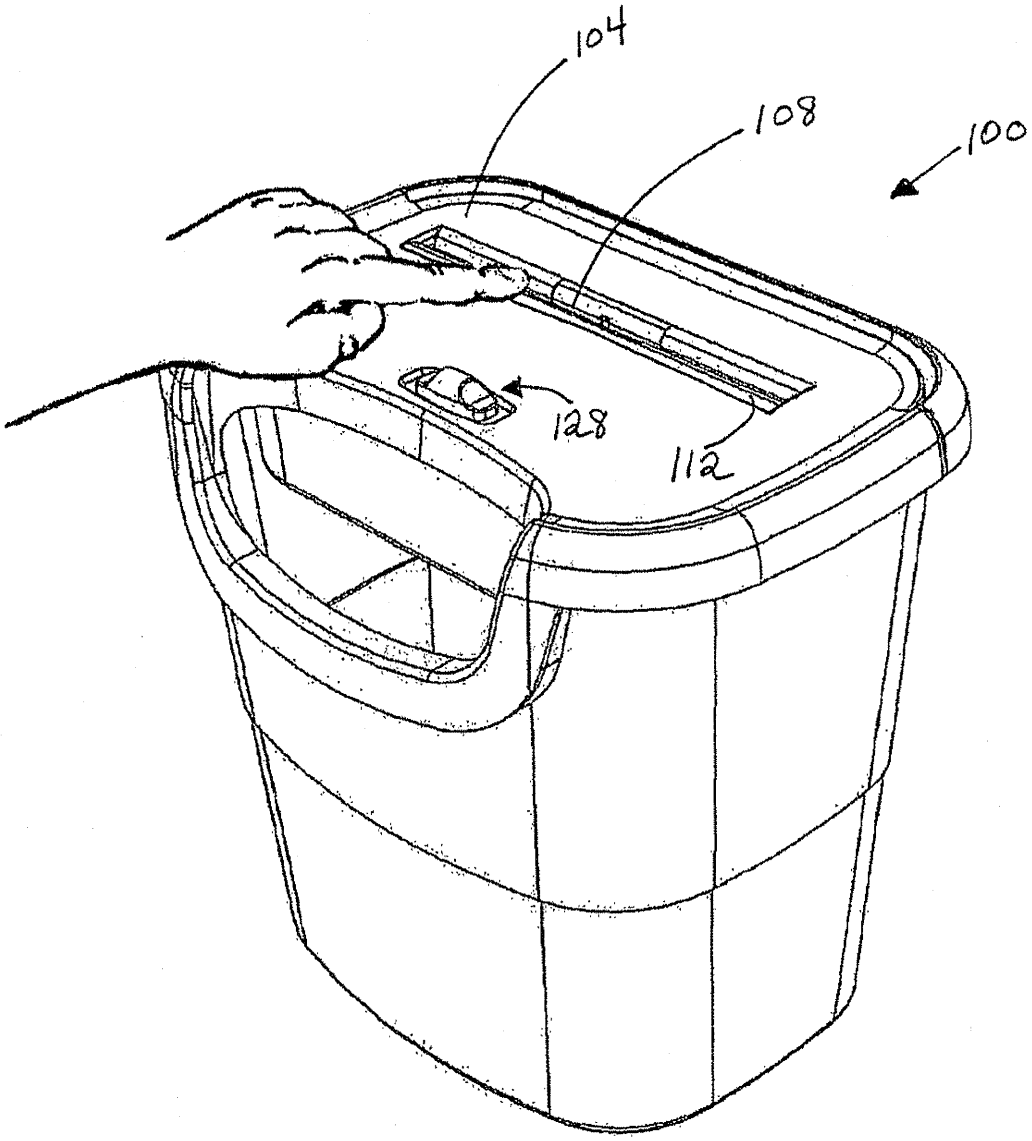

FIG. 3

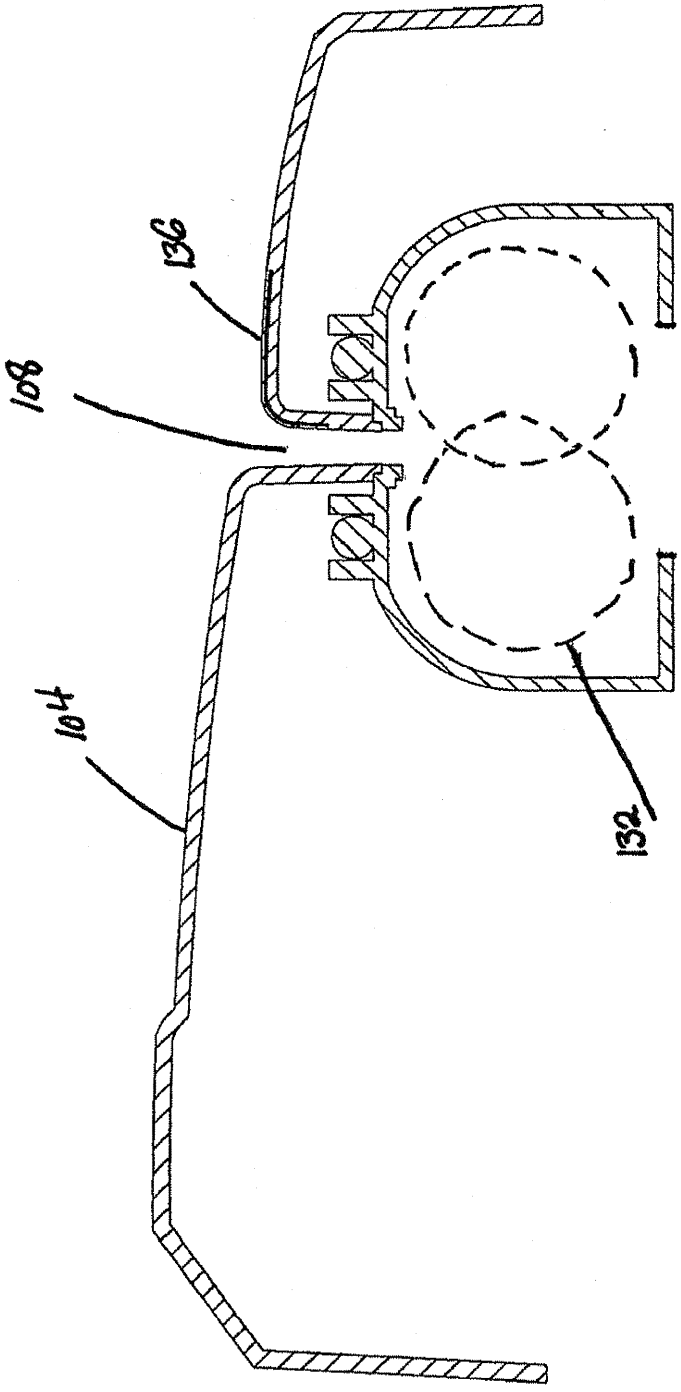

FIG. 4

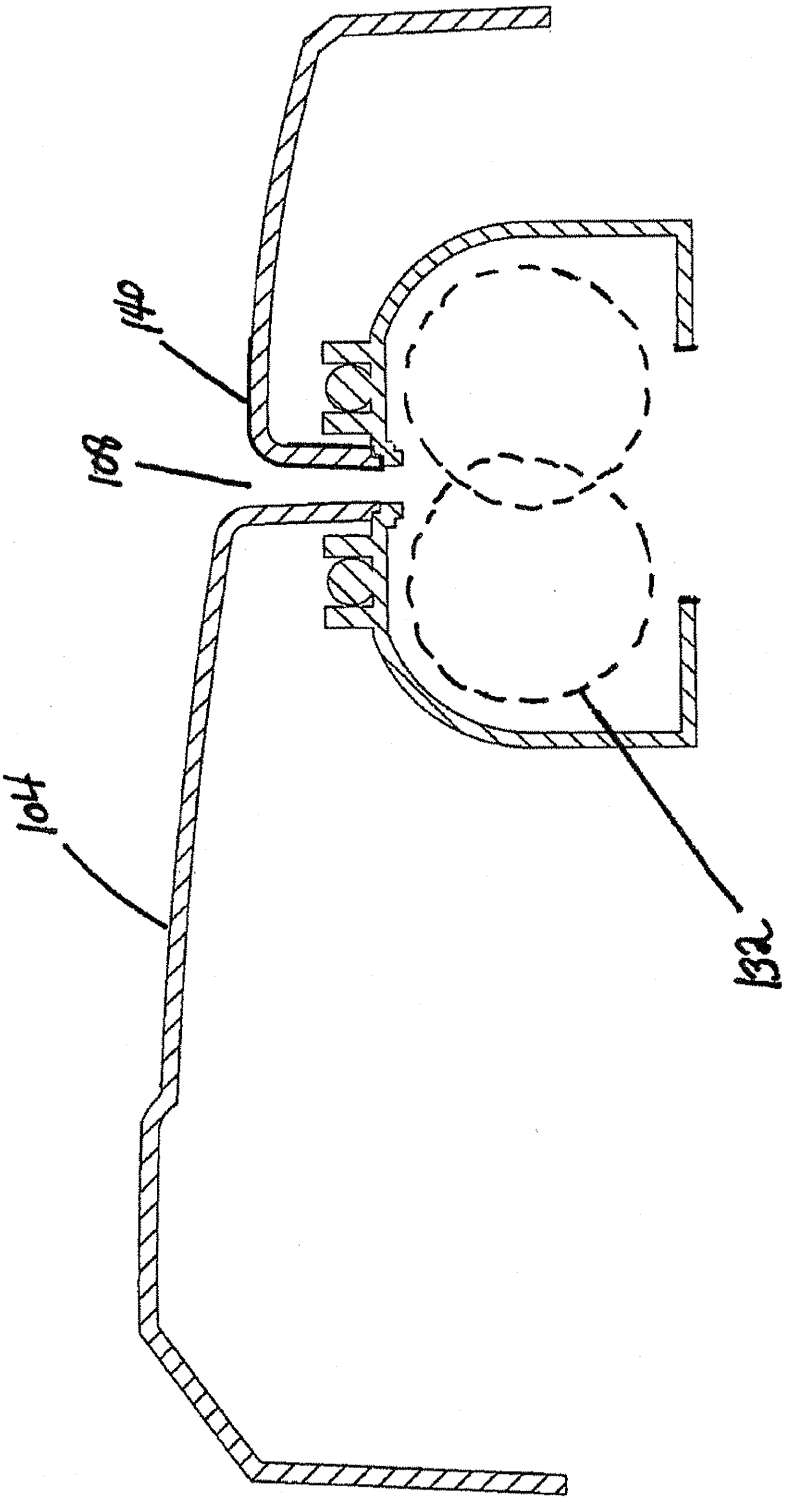

FIG. 5

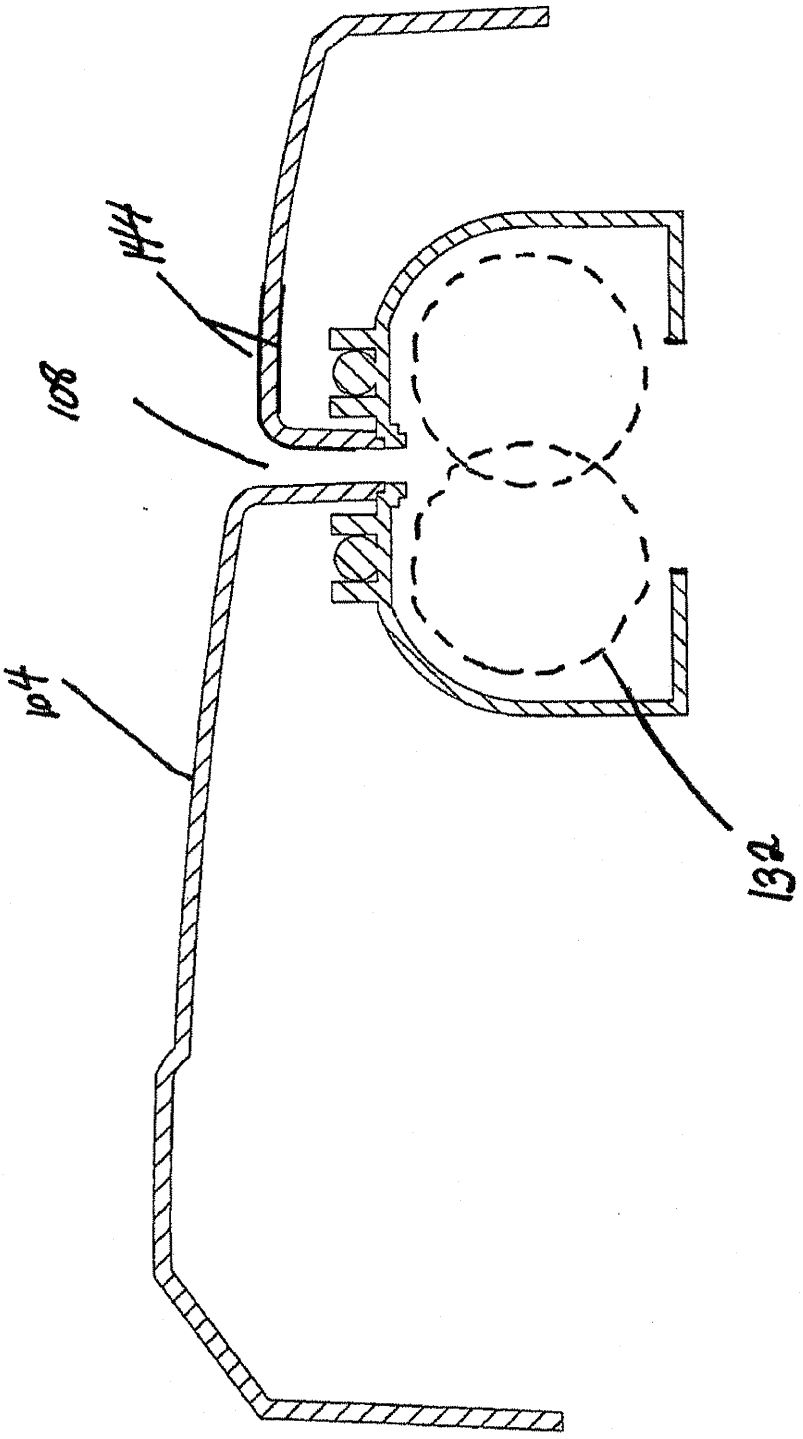

FIG. 6

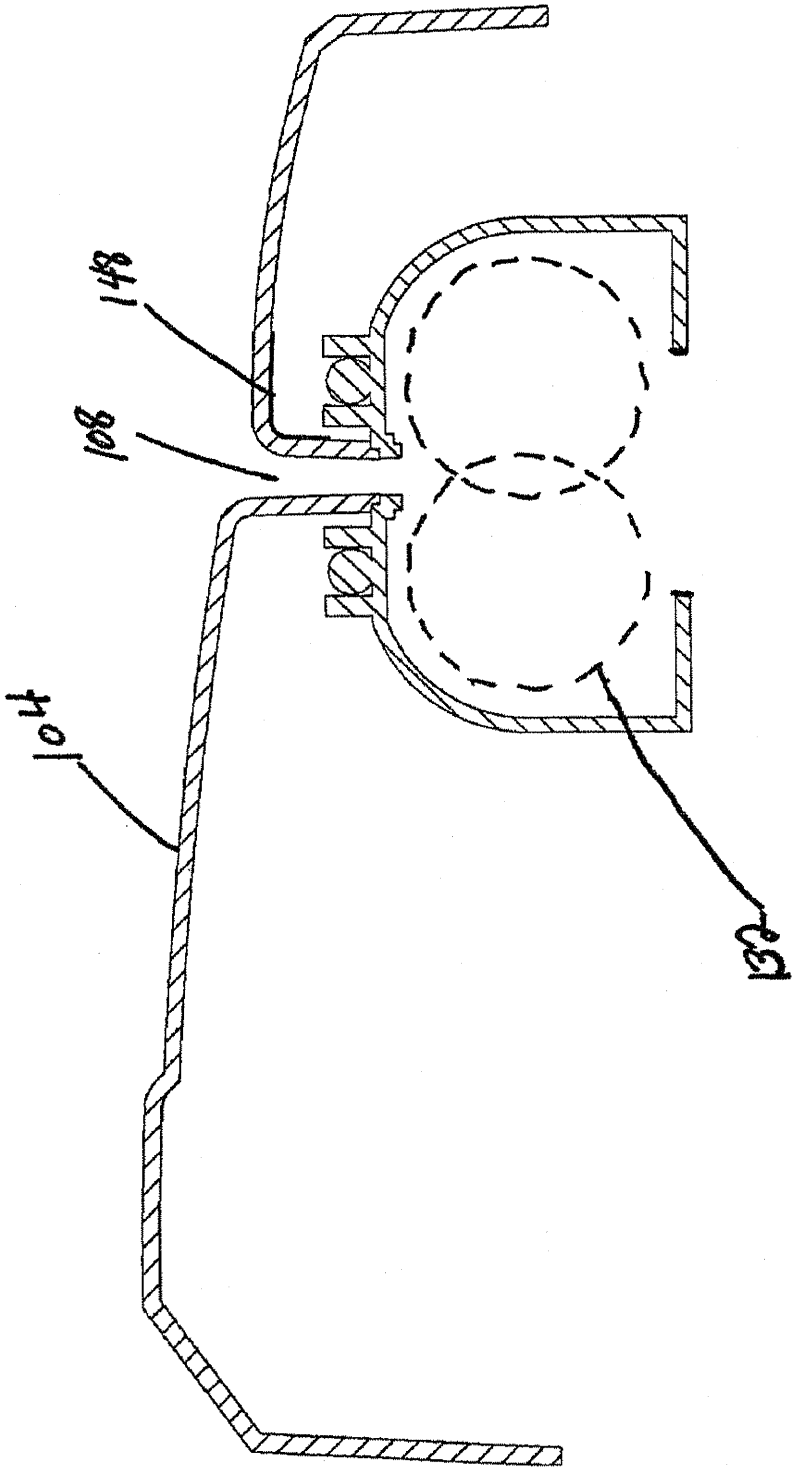

FIG. 7

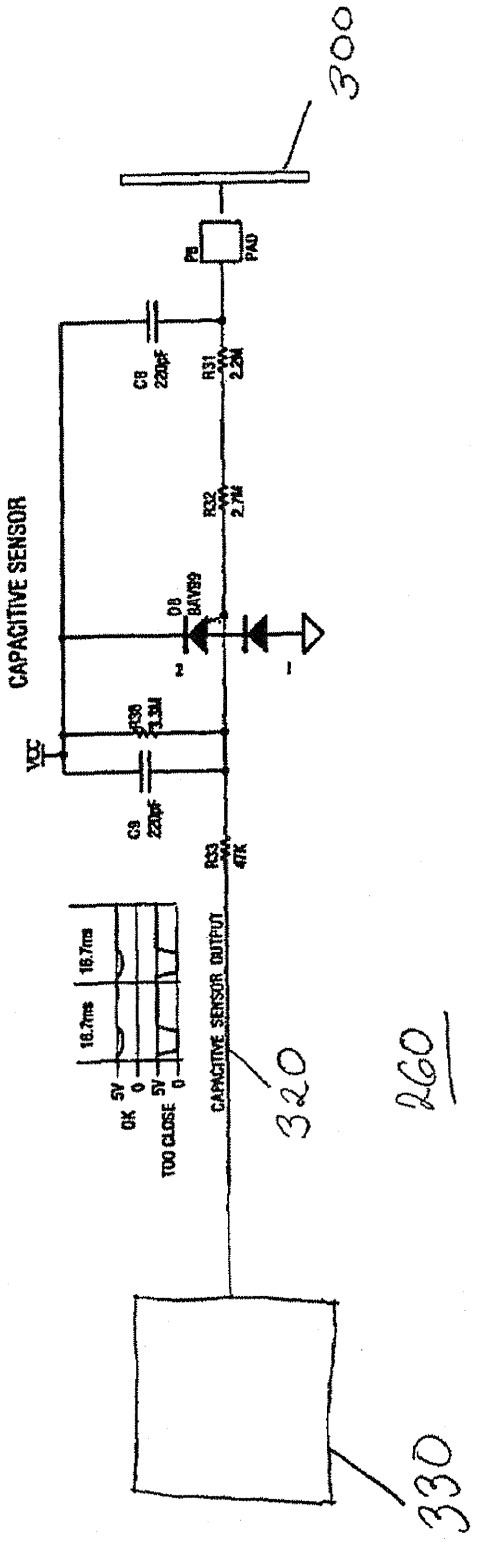
300
PAD
C8
220pF
R31
2.2M
R32
2.7M
CAPACITIVE SENSOR
D8
BAV99
R36
2.2M
VCC
C9
220pF
R33
47K
16.7ms
16.7ms
5V
0
5V
0
OK
TOO CLOSE
CAPACITIVE SENSOR OUTPUT
320
260
330

FIG. 8

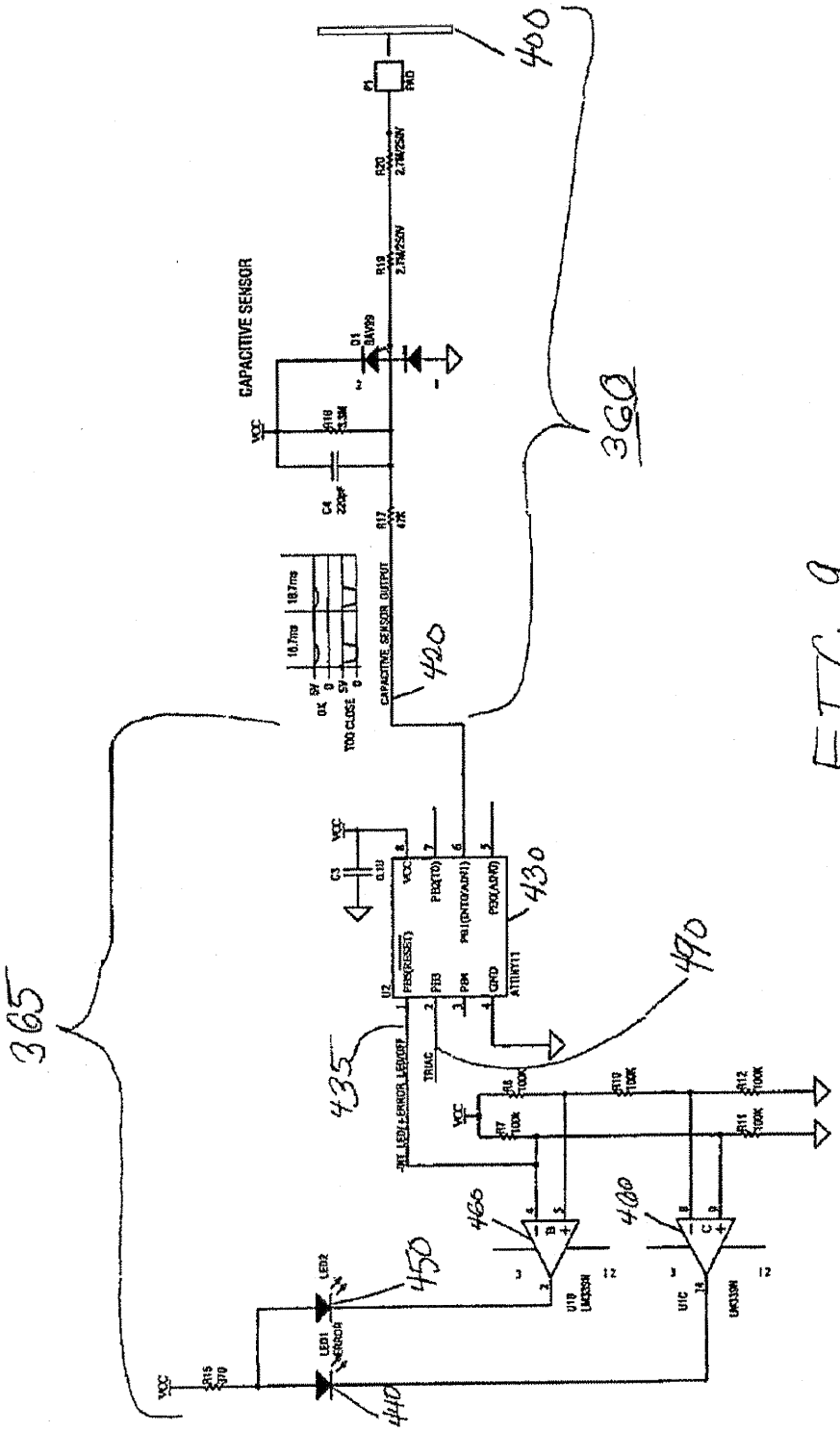
400
360
365
420
430
435
490
450
460
470
440
CAPACITIVE SENSOR
CAPACITIVE SENSOR OUTPUT
TOO CLOSE
VCC
TRIAC
LED1
LED2

FIG. 9

SHREDDER WITH PROXIMITY SENSING SYSTEM

FIELD OF THE INVENTION

The present invention relates to shredders for destroying articles, such as documents, CDs, etc.

BACKGROUND OF THE INVENTION

Shredders are well known devices for destroying articles, such as documents, CDs, floppy disks, etc. Typically, users purchase shredders to destroy sensitive articles, such as credit card statements with account information, documents containing company trade secrets, etc.

A common type of shredder has a shredder mechanism contained within a housing that is removably mounted atop a container. The shredder mechanism typically has a series of cutter elements that shred articles fed therein and discharge the shredded articles downwardly into the container. It is generally desirable to prevent a person's or animal's body part from contacting these cutter elements during the shredding operation.

The present invention endeavors to provide various improvements over known shredders.

SUMMARY OF THE INVENTION

One aspect of the present invention provides a shredder comprising a housing, a shredder mechanism including a motor and cutter elements, a proximity sensor, and a controller. The shredder mechanism enables articles to be shredded to be fed into the cutter elements, and the motor is operable to drive the cutter elements so that the cutter elements shred the articles fed therein.

The housing has an opening enabling articles to be fed therethrough into the cutter elements of the shredder mechanism for shredding. The proximity sensor is located adjacent the opening and configured to indicate the presence of a person or animal in proximity to the opening. The controller is operable to perform a predetermined operation (e.g., to disable the shredder mechanism) responsive to the indicated presence of the person or animal.

Another aspect of the invention provides a shredder with a proximity sensor that includes an electroconductive element and circuitry to sense a state of the electroconductive element. The proximity sensor is configured to indicate a change in the state of the electroconductive element corresponding to a change in capacitance caused by a person or animal approaching in proximity to the electroconductive element. A controller of the shredder is operable to perform a predetermined operation responsive to the indicated change in the state of the electroconductive element.

Other objects, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a shredder constructed in accordance with an embodiment of the present invention;

FIG. **2** is an exploded perspective view of the shredder of FIG. **1**;

FIG. **3** is a perspective view of a shredder constructed in accordance with an embodiment of the present invention;

FIGS. **4-7** are cross-sectional views each showing a shredder housing, opening, cutting elements, and conductor configuration for a sensor in accordance with various embodiments of the present invention; and

FIGS. **8** and **9** illustrate example capacitive sensor circuits according to respective embodiments of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIGS. **1** and **2** illustrate a shredder constructed in accordance with an embodiment of the present invention. The shredder is generally indicated at **10**. The shredder **10** sits atop a waste container, generally indicated at **12**, which is formed of molded plastic or any other material. The shredder **10** illustrated is designed specifically for use with the container **12**, as the shredder housing **14** sits on the upper periphery of the waste container **12** in a nested relation. However, the shredder **10** may also be designed so as to sit atop a wide variety of standard waste containers, and the shredder **10** would not be sold with the container. Likewise, the shredder **10** could be part of a large freestanding housing, and a waste container would be enclosed in the housing. An access door would provide for access to and removal of the container. Generally speaking, the shredder **10** may have any suitable construction or configuration and the illustrated embodiment is not intended to be limiting in any way.

The shredder **10** includes a shredder mechanism **16** including an electrically powered motor **18** and a plurality of cutter elements (not shown). "Shredder mechanism" is a generic structural term to denote a device that shreds articles using cutter elements. Such shredding may be done in any particular way. The cutter elements are mounted on a pair of parallel rotating shafts (not shown). The motor **18** operates using electrical power to rotatably drive the shafts and the cutter elements through a conventional transmission **23** so that the cutter elements shred articles fed therein. The shredder mechanism **16** may also include a sub-frame **21** for mounting the shafts, the motor **18**, and the transmission **23**. The operation and construction of such a shredder mechanism **16** are well known and need not be described herein in detail. Generally, any suitable shredder mechanism **16** known in the art or developed hereafter may be used.

The shredder **10** also includes the shredder housing **14**, mentioned above. The shredder housing **14** includes top wall **24** that sits atop the container **12**. The top wall **14** is molded from plastic and an opening **26** is located at a front portion thereof. The opening **26** is formed in part by a downwardly depending generally U-shaped member **28**. The U-shaped member **28** has a pair of spaced apart connector portions **27** on opposing sides thereof and a hand grip portion **28** extending between the connector portions **27** in spaced apart relation from the housing **14**. The opening **26** allows waste to be discarded into the container **12** without being passed through the shredder mechanism **16**, and the member **28** may act as a handle for carrying the shredder **10** separate from the container **12**. As an optional feature, this opening **26** may be provided with a lid, such as a pivoting lid, that opens and closes the opening **26**. However, this opening in general is optional and may be omitted entirely. Moreover, the shredder housing **14** and its top wall **24** may have any suitable construction or configuration.

The shredder housing **14** also includes a bottom receptacle **30** having a bottom wall, four side walls and an open top. The shredder mechanism **16** is received therein, and the receptacle **30** is affixed to the underside of the top wall **24**

by fasteners. The receptacle **30** has an opening **32** in its bottom wall through which the shredder mechanism **16** discharges shredded articles into the container **12**.

The top wall **24** has a generally laterally extending opening **36** extending generally parallel and above the cutter elements. The opening **36**, often referred to as a throat, enables the articles being shredded to be fed into the cutter elements. As can be appreciated, the opening **36** is relatively narrow, which is desirable for preventing overly thick items, such as large stacks of documents, from being fed into cutter elements, which could lead to jamming. The opening **36** may have any configuration.

The top wall **24** also has a switch recess **38** with an opening therethrough. An on/off switch **42** includes a switch module (not shown) mounted to the top wall **24** underneath the recess **38** by fasteners, and a manually engageable portion **46** that moves laterally within the recess **38**. The switch module has a movable element (not shown) that connects to the manually engageable portion **46** through the opening **40**. This enables movement of the manually engageable portion **46** to move the switch module between its states.

In the illustrated embodiment, the switch module connects the motor **18** to the power supply (not shown). Typically, the power supply will be a standard power cord **44** with a plug **48** on its end that plugs into a standard AC outlet. The switch **42** is movable between an on position and an off position by moving the portion **46** laterally within the recess **38**. In the on position, contacts in the switch module are closed by movement of the manually engageable portion **46** and the movable element to enable a delivery of electrical power to the motor **18**. In the off position, contacts in the switch module are opened to disable the delivery of electric power to the motor **18**.

As an option, the switch **42** may also have a reverse position wherein contacts are closed to enable delivery of electrical power to operate the motor **18** in a reverse manner. This would be done by using a reversible motor and applying a current that is of a reverse polarity relative to the on position. The capability to operate the motor **18** in a reversing manner is desirable to move the cutter elements in a reversing direction for clearing jams. In the illustrated embodiment, in the off position the manually engageable portion **46** and the movable element would be located generally in the center of the recess **38**, and the on and reverse positions would be on opposing lateral sides of the off position.

Generally, the construction and operation of the switch **42** for controlling the motor **42** are well known and any construction for such a switch **42** may be used.

The top cover **24** also includes another recess **50** associated with a switch lock **52**. The switch lock **52** includes a manually engageable portion **54** that is movable by a user's hand and a locking portion (not shown). The manually engageable portion **54** is seated in the recess **50** and the locking portion is located beneath the top wall **24**. The locking portion is integrally formed as a plastic piece with the manually engageable portion **54** and extends beneath the top wall **24** via an opening formed in the recess **50**.

The switch lock **52** causes the switch **42** to move from either its on position or reverse position to its off position by a camming action as the switch lock **52** is moved from a releasing position to a locking position. In the releasing position, the locking portion is disengaged from the movable element of the switch **42**, thus enabling the switch **42** to be moved between its on, off, and reverse positions. In the locking position, the movable element of the switch **42** is restrained in its off position against movement to either its on or reverse position by the locking portion of the switch lock **52**.

Preferably, but not necessarily, the manually engageable portion **54** of the switch lock **52** has an upwardly extending projection **56** for facilitating movement of the switch lock **52** between the locking and releasing positions.

One advantage of the switch lock **52** is that, by holding the switch **42** in the off position, to activate the shredder mechanism **16** the switch lock **52** must first be moved to its releasing position, and then the switch **42** is moved to its on or reverse position. This reduces the likelihood of the shredder mechanism **16** being activated unintentionally.

In the illustrated embodiment, the shredder housing **14** is designed specifically for use with the container **12** and it is intended to sell them together. The upper peripheral edge **60** of the container **12** defines an upwardly facing opening **62**, and provides a seat **61** on which the shredder **10** is removably mounted. The seat **61** includes a pair of pivot guides **64** provided on opposing lateral sides thereof. The pivot guides **64** include upwardly facing recesses **66** that are defined by walls extending laterally outwardly from the upper edge **60** of the container **12**. The walls defining the recesses **66** are molded integrally from plastic with the container **12**, but may be provided as separate structures and formed from any other material. At the bottom of each recess **66** is provided a step down or ledge providing a generally vertical engagement surface **68**. This step down or ledge is created by two sections of the recesses **66** being provided with different radii.

The shredder **10** has a proximity sensor to detect the presence of a person or thing (e.g., animal or inanimate object) in proximity to the opening **36**. A person or thing is "in proximity" to the opening **36** when a part thereof is outside and adjacent to the opening **36** or at least partially within the opening **36**. The proximity sensor may be implemented in various ways, such as is described in further detail below. For further examples of shredders on which a proximity sensor may be used, reference may be made to U.S. patent application Ser. No. 10/828,254 (filed Apr. 21, 2004), Ser. No. 10/815,761 (filed Apr. 2, 2004), and Ser. No. 10/347,700 (filed Jan. 22, 2003), each of which is hereby incorporated into the present application by reference. Generally, the proximity sensor may be used with any type of shredder, and the examples identified herein are not intended to be limiting.

FIG. **3** is a perspective view of a shredder **100** constructed in accordance with an embodiment of the present invention. The shredder **100** incorporates a capacitive sensor. The illustrated capacitive sensor is a switch that detects the presence of a person or thing without requiring physical contact. The capacitive sensor includes a conductor/contact plate **112** connected to a circuit, such as those shown in FIGS. **8** and **9**. The conductor **112** serves as the first plate of a capacitor, while the person or thing to be detected serves as the second plate thereof. As the distance between the conductor **112** and the person or thing decreases, the mutual capacitance therebetween increases. This increase in capacitance results in increased signal levels in the sensor, which levels can be used to detect the proximity of the person or thing.

It is to be appreciated that capacitance depends in part on the dielectric constant of the second plate of a capacitor. A higher dielectric constant translates into a larger capacitance. Therefore, the capacitive sensor of the shredder **100** can detect the proximity of a nearby animate or inanimate entity provided that its respective dielectric constant is

sufficiently high. Because human beings and various animals have relatively high dielectric constants, they are detectable by the capacitive sensor. Inanimate objects with relatively high dielectric constants also are detectable. Conversely, objects with low or moderate dielectric constants, such as paper, are not detectable.

The shredder **100** includes a shredder housing **104**, an opening **108**, and a control switch **128** with on, off, and reverse positions. A shredder mechanism, such as the one described above, is located beneath the opening **108** so that documents can be fed into the shredder mechanism through the opening **108**.

The conductor **112** can be, for example, a strip of metal, foil tape (e.g., copper tape), conductive paint, a silk-screened conductive ink pattern, or another suitable conductive material. As shown in FIG. **3**, the conductor **112** is a 9-inch by 1-inch capacitive sensing strip that is affixed to the housing **104** near the opening **108**. As such, when a person or thing nears the opening **108** and thus the cutter elements of the shredding mechanism of the shredder **100**, the capacitance between the conductor **112** and the person or thing increases, resulting in an increase in the signal level used for detection, as will be described below. To ensure that the switch is sensitive enough to detect the person or thing through multiple sheets of paper, the conductor **112** extends into the opening **108** to increase the overall surface area of the conductor **112** and thus the amount of capacitance between the conductor **112** and the nearby person or thing. The conductor **112** optionally can be covered by non-conductive plastic, for example, thus concealing the switch from a user of the shredder **100**. In addition, to increase sensitivity of the switch, such non-conductive plastic can be covered with a conductive material, such as metal foil.

Though not illustrated in FIG. **3**, the shredder **100** can include a sensor light, an error light, and/or a light indicative of normal operation. The sensor light, which can be an LED, is illuminated when a person or thing is detected. The error light, which also can be an LED, is illuminated when a person or thing is detected, and optionally under other conditions (e.g., the shredder container is not properly engaged with the shredder **100**, or the shredder mechanism has become jammed). These lights, however, are not necessary, and are only optional features.

FIGS. **4-7** are cross-sectional views each showing a shredder housing **104**, opening **108**, cutting elements **132**, and a conductor configuration for a sensor in accordance with various embodiments of the present invention. The conductor configurations can include conductor(s) of different areas to tailor the amount of capacitance and thus the signal level produced when a person or thing nears the shredder. Where multiple conductors are employed, the distance therebetween may be designed also to tailor the amount of capacitive coupling and thus the capacitance produced.

In FIG. **4**, the conductor **136** comprises a conductive material embedded within the upper wall of the housing **104** beneath the upper surface partially into the opening **108**. The conductor **136** also is optionally embedded in the wall defining the opening **108** and extends along it for a portion.

In FIG. **5**, the conductive material of the conductor **140** covers an upper surface portion of the housing **104**, extends substantially into the opening **108**, and curves around a flange of the housing **104** so as to cover an inside surface portion of the housing **104**. For a conductor **140** that has a noticeable amount of thickness, the top portion of the upper surface where the conductor **140** is mounted may be recessed.

The conductor **144** of FIG. **6** includes two conductive portions respectively affixed to outside and inside surface portions of the housing **104**. Such use of multiple portions increases the surface area of the capacitor, as well as the capacitive coupling, capacitance, and signal level produced when a person or thing nears the conductive portions.

The conductor **148** of FIG. **7** comprises a conductive material on an inside surface portion of the housing **104**. This is desirable for concealing the conductor **148** without adding the manufacturing step of embedding the conductor in a housing wall, such as is shown in FIG. **4**. It is to be appreciated that the conductors of FIGS. **4-7** may be of any suitable configuration, and the examples illustrated are in no way intended to be limiting.

A conductor or conductive material such as described above in connection with FIGS. **3-7** is typically connected to circuitry on a circuit board. FIGS. **8** and **9** illustrate example capacitive sensor circuits according to respective embodiments of the present invention. The example circuits may be incorporated into the overall circuit design of a shredder, and are in no way intended to be limiting.

In FIG. **8**, the capacitive sensor circuit **260** includes a conductor **300** that can have a configuration such as shown above or another suitable configuration. The conductor **300** is connected to a pad P**8**, which is in turn connected to circuit loops including capacitors C**8** and C**9**, resistors R**31**, R**32**, and R**36**, and a high-speed double diode D**8**. The loops are connected to a voltage supply Vcc, circuit ground, and a resistor R**33**. The voltage supply Vcc is connected to the AC line voltage of the shredder, and a negative regulator can generate −5 volts for the circuit ground. The capacitive sensor output **320** may be in turn coupled as an input to a controller **330**, such as a microprocessor or discrete circuit components (e.g., comparators, transistors), which takes appropriate action in response to signal levels at the output **320**. Such a controller **330** may also be a relay switch that opens to disable the delivery of power to an element (e.g., the motor of the shredder mechanism) and closes to enable the delivery of power. It is to be appreciated that "controller" is a generic structural term that denotes structure(s) that control one or more modules, devices, and/or circuit components.

The principles of operation of the circuit **260** will be readily understood by those conversant with the art. When a person or thing moves close to the conductor **300**, the increased capacitance therebetween causes the amplitude of the sinusoidal waveform at the output **320** to increase by a voltage sufficient to indicate the presence of the person or thing. Based on the increased signal level, the controller **330** can, for example, disable the cutting elements of the shredder, illuminate a sensor or error light, and/or activate an audible alert.

FIG. **9** illustrates a capacitive sensor circuit **360**, as well as control and illumination circuitry **365**. The capacitive sensor circuit **360** includes a conductor **400** that can have a configuration such as shown above or another suitable configuration. The conductor **400** is connected to a pad P1, which is in turn connected to series resistors R**19** and R**20**. The resistor R**19** is connected to circuit loops including a capacitor C**4**, a resistor R**16**, and a high-speed double diode D1. The loops are connected to a voltage supply Vcc, circuit ground, and a resistor R**17**. The voltage supply Vcc is connected to the AC line voltage of the shredder, and a negative regulator can generate −5 volts for the circuit ground. The capacitive sensor output **420** is coupled as an input to a controller **430**, which can be, for example, a

simple analog circuit or an ATtiny11 8-bit microcontroller offered by Atmel Corporation (San Jose, Calif.).

The principles of operation of the circuitry of FIG. **9** will be readily understood by those conversant with the art. When a person or thing moves close to the conductor **400**, the increased capacitance therebetween causes the amplitude of the sinusoidal waveform at the output **420** to increase by a voltage sufficient to indicate the presence of the person or thing. Based on the increased signal level, the controller **430** sends appropriate control signals. For example, the controller **430** sends a control signal **490** to cut off power (such as supplied by a triac) to the motor that drives the cutting elements of the shredder, and a control signal **435** to illuminate a sensor LED **450** or error LED **440** coupled to comparators **460**.

Embodiments of the present invention may be incorporated, for instance, in a shredder such as the PS80C-2 shredder of Fellowes, Inc. (Itasca, Ill.). If desired, existing shredder designs may be adapted, without major modification of existing modules, to incorporate proximity sensing circuitry.

In another embodiment of the invention, a shredder can provide two or more sensitivity settings for proximity sensing. The settings can be selectably enabled by a user and tailored to detect, e.g., infants or pets. In an example embodiment employing a capacitive sensor, objects are distinguished based on load times. A smaller capacitive load results in a shorter load time than a large capacitance. Thus, by measuring (e.g., with a microprocessor) differences in load times resulting from capacitive loads near a sensor, various objects can be distinguished.

Although various illustrated embodiments herein employ capacitive sensors, it is to be noted that other approaches may be employed to detect the presence of a person or thing near a shredder, such as, for example, approaches utilizing eddy current, inductive, photoelectric, ultrasonic, Hall effect, or infrared proximity sensor technologies.

The foregoing illustrated embodiments have been provided to illustrate the structural and functional principles of the present invention and are not intended to be limiting. To the contrary, the present invention is intended to encompass all modifications, alterations and substitutions within the spirit and scope of the appended claims.

What is claimed is:

1. A document shredder for shredding one or more data bearing documents selected from the group consisting of paper, optical discs, and floppy disks, comprising:

a housing;

a document shredder mechanism received in the housing and including an electrically powered motor and cutter elements, the document shredder mechanism enabling one or more data bearing documents selected from the group consisting of paper, optical discs, and floppy disks to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the one or more documents fed therein;

the housing having an opening enabling the one or more data bearing documents to be fed therethrough into the cutter elements of the document shredder mechanism for shredding;

a waste bin disposed beneath the document shredder mechanism, the waste bin being configured to receive shredded documents from the document shredder mechanism, the waste bin being manually removable from beneath the document shredder mechanism for emptying of the shredded documents therein;

a discriminating proximity sensor comprising an electroconductive sensor element at least in part adjacent the opening, the proximity sensor being configured to indicate a presence of a person or animal, but not a presence of the one or more data bearing documents, in proximity to the opening based on the detection via the sensor element of an inherent electrical characteristic of the person or animal; and

a controller operable to disable the cutter elements responsive to the indicated presence of the person or animal.

2. A shredder according to claim **1**, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

3. A shredder according to claim **1**, wherein the controller is also operable to illuminate an indicator responsive to the indicated presence of the person or animal.

4. A shredder according to claim **1**, wherein the controller comprises a microcontroller.

5. A shredder according to claim **1**, wherein the proximity sensor is a capacitive sensor for detecting a capacitance between the sensor element and the person or animal.

6. A shredder according to claim **5**, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

7. A shredder according to claim **6**, wherein the electroconductive element is a thin metal member extending along a portion of the housing adjacent the opening.

8. A shredder according to claim **7**, wherein the metal member is provided on an interior surface of the housing.

9. A shredder according to claim **8**, wherein the metal member is provided only on an interior surface of the housing, and not on an exterior surface.

10. A shredder according to claim **8**, wherein the metal member is also provided on an exterior surface of the housing.

11. A shredder according to claim **10**, wherein the portion of the housing on which the metal member is provided has an edge that defines part of the opening, and wherein the metal member extends from the interior surface of the housing to the exterior surface over the edge.

12. A shredder according to claim **7**, wherein the shredder mechanism is embedded within the housing.

13. A shredder according to claim **7**, wherein the metal member is at least in part adhered to the portion of the housing adjacent the opening.

14. A shredder according to claim **13**, wherein the metal member comprises metal tape.

15. A shredder according to claim **7**, wherein the metal member is at least in part covered by a non-conductive member.

16. A shredder according to claim **15**, wherein the non-conductive member is at least in part covered by a conductive member.

17. A shredder according to claim **6**, wherein the electroconductive element at least in part comprises metal paint applied to a portion of the housing or to a member associated with the housing.

18. A shredder according to claim **6**, wherein the electroconductive element includes at least two metal members each extending along a portion of the housing adjacent the opening.

19. A shredder according to claim **1**, wherein the controller at least in part comprises a microprocessor.

20. A shredder according to claim **1**, wherein the controller at least in part comprises discrete circuit components.

21. A shredder according to claim 1, wherein the controller at least in part comprises an analog circuit.

22. A shredder according to claim 5, wherein the opening is an elongated, narrow opening.

23. A shredder according to claim 22, wherein the elongated, narrow opening is defined by a pair of opposing walls, and wherein the sensor element of the proximity sensor is attached to at least one of the walls.

24. A shredder according to claim 23, wherein the sensor element of the proximity sensor extends along the at least one of the walls for essentially an entire length of the opening.

25. A shredder according to claim 23, wherein the sensor element extends along both of the walls.

26. A shredder according to claim 25, wherein the sensor element extends along the walls for essentially an entire length of the opening.

27. A shredder according to claim 23, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

28. A shredder according to claim 24, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

29. A shredder according to claim 25, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

30. A shredder according to claim 26, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

31. A shredder according to claim 1, wherein:

wherein the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

32. A shredder according to claim 22, wherein:

wherein the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

33. A shredder according to claim 23, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

34. A shredder according to claim 24, wherein:

wherein the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

35. A shredder according to claim 25, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

36. A shredder according to claim 26, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

37. A shredder according to claim 27, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

38. A shredder according to claim 28, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

39. A shredder according to claim 29, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

40. A shredder according to claim 30, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

41. A shedder according to claim 1, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

42. A shredder according to claim 22, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

43. A shredder according to claim 23, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

44. A shredder according to claim 24, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

45. A shredder according to claim 25, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

46. A shredder according to claim 26, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

47. A shredder according to claim 27, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

48. A shredder according to claim 28, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

49. A shredder according to claim 29, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

50. A shredder according to claim 30, wherein the proximity sensor is configured to indicate the presence of the person or the animal in proximity to the opening without requiring contact with the sensor element.

51. A shredder according to claim 41, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

52. A shredder according to claim 42, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

53. A shredder according to claim 43, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

54. A shredder according to claim 44, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

55. A shredder according to claim 45, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

56. A shredder according to claim 46, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

57. A shredder according to claim 47, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

58. A shredder according to claim 48, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

59. A shredder according to claim 49, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

60. A shredder according to claim 50, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

61. A shredder according to claim 6, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

62. A shredder according to claim 22, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

63. A shredder according to claim 23, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

64. A shredder according to claim 24, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

65. A shredder according to claim 25, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

66. A shredder according to claim 26, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

67. A shredder according to claim 31, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

68. A shredder according to claim 32, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

69. A shredder according to claim 33, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

70. A shredder according to claim 34, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

71. A shredder according to claim 35, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

72. A shredder according to claim 36, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

73. A shredder according to claim 41, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

74. A shredder according to claim 42, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

75. A shredder according to claim 43, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

76. A shredder according to claim 44, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

77. A shredder according to claim 45, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

78. A shredder according to claim 46, wherein the cutter elements are disabled by disabling power to the motor responsive to the indicated presence of the person or animal.

79. A shredder according to claim 5, wherein the opening is an elongated opening.

80. A shredder according to claim 79, wherein the elongated opening is defined by a pair of opposing walls, and wherein the sensor element of the proximity sensor is attached to at least one of the walls.

81. A shredder according to claim 80, wherein the sensor element of the proximity sensor extends along the at least one of the walls for essentially an entire length of the opening.

82. A shredder according to claim 80, wherein the sensor element extends along both of the walls.

83. A shredder according to claim 82, wherein the sensor element extends along the walls for essentially an entire length of the opening.

84. A shredder according to claim 80, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

85. A shredder according to claim 81, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

86. A shredder according to claim 82, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

87. A shredder according to claim 83, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

88. A shredder according to claim 79, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

89. A shredder according to claim 80, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

90. A shredder according to claim 81, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

91. A shredder according to claim 82, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

92. A shredder according to claim 83, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

93. A shredder according to claim 84, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

94. A shredder according to claim 85, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

95. A shredder according to claim 86, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

96. A shredder according to claim 87, wherein:

the proximity sensor further comprises circuitry to sense a state of the electroconductive sensor element.

97. A shredder according to claim 1, wherein the opening is an elongated, narrow opening.

98. A shredder according to claim 97, wherein the elongated, narrow opening is defined by a pair of opposing walls, and wherein the sensor element of the proximity sensor is attached to at least one of the walls.

99. A shredder according to claim 98, wherein the sensor element of the proximity sensor extends along the at least one of the walls for essentially an entire length of the opening.

100. A shredder according to claim 98, wherein the sensor element extends along both of the walls.

101. A shredder according to claim 100, wherein the sensor element extends along the walls for essentially an entire length of the opening.

102. A shredder according to claim 98, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

103. A shredder according to claim 99, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

104. A shredder according to claim 100, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

105. A shredder according to claim 101, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

106. A shredder according to claim 1, wherein the opening is an elongated opening.

107. A shredder according to claim 106, wherein the elongated opening is defined by a pair of opposing walls, and wherein the sensor element of the proximity sensor is attached to at least one of the walls.

108. A shredder according to claim 107, wherein the sensor element of the proximity sensor extends along the at least one of the walls for essentially an entire length of the opening.

109. A shredder according to claim 107, wherein the sensor element extends along both of the walls.

110. A shredder according to claim 109, wherein the sensor element extends along the walls for essentially an entire length of the opening.

111. A shredder according to claim 107, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

112. A shredder according to claim 108, wherein the sensor element is provided on an external surface of the at least one of the walls and thereby defines the opening at least in part.

113. A shredder according to claim 109, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

114. A shredder according to claim 110, wherein the sensor element is provided on an external surface of both the walls and thereby defines the opening at least in part.

* * * * *

EXHIBIT B

US007040559B2

(12) **United States Patent**
Matlin et al.

(10) **Patent No.: US 7,040,559 B2**
(45) **Date of Patent: May 9, 2006**

(54) **SHREDDER WITH LOCK FOR ON/OFF SWITCH**

(75) Inventors: **Taihoon K. Matlin**, Round Lake Beach, IL (US); **David G. Hartnett**, Carol Stream, IL (US)

(73) Assignee: **Fellowes Inc.**, Itasca, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 110 days.

(21) Appl. No.: **10/815,761**

(22) Filed: **Apr. 2, 2004**

(65) **Prior Publication Data**

US 2005/0218250 A1 Oct. 6, 2005

(51) **Int. Cl.**
B02C 25/00 (2006.01)

(52) **U.S. Cl.** **241/36**; 241/37.5; 241/100; 241/101.3

(58) **Field of Classification Search** 241/36, 241/37.5, 100, 101.3
See application file for complete search history.

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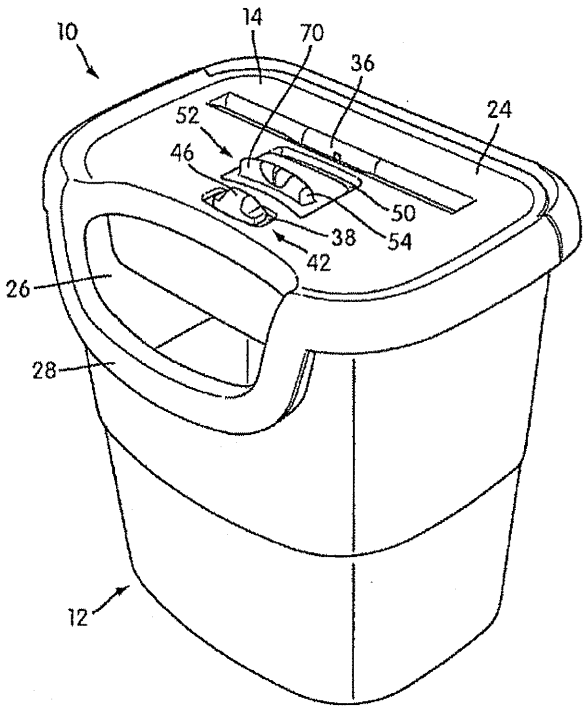
Primary Examiner—Mark Rosenbaum
(74) *Attorney, Agent, or Firm*—Pillsbury Winthrop Shaw Pittman, LLP

(57) **ABSTRACT**

The present application discloses a shredder with a switch lock that locks the on/off switch in its on/off position.

37 Claims, 14 Drawing Sheets



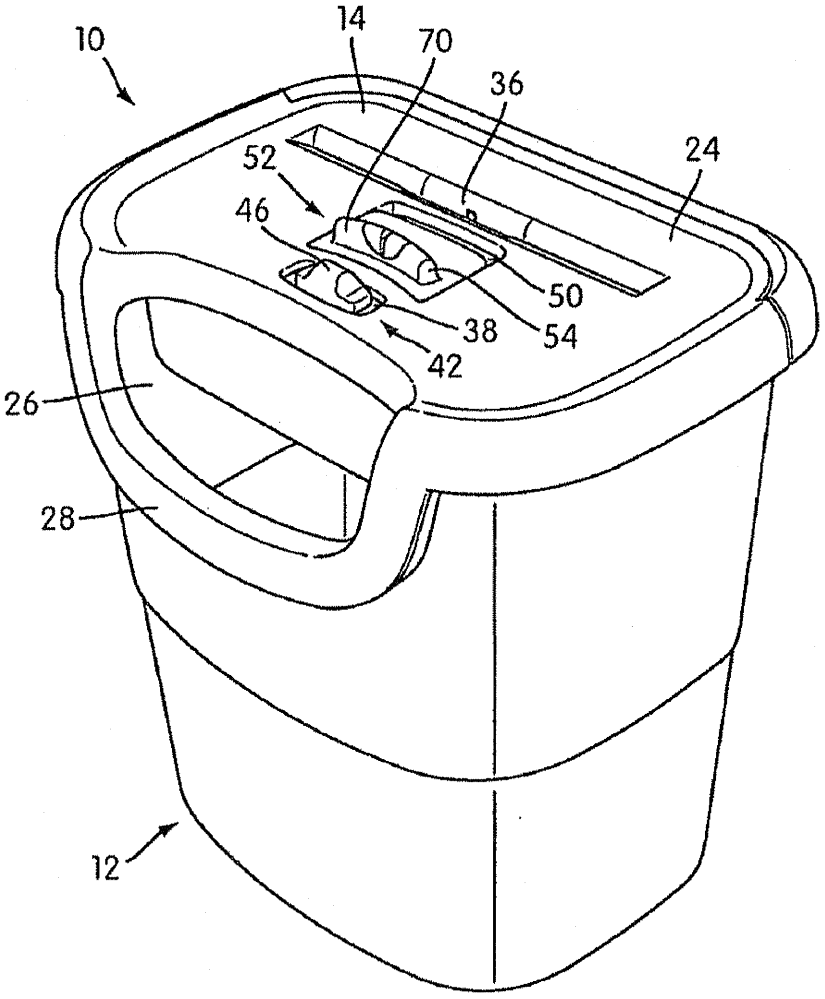


FIG. 1

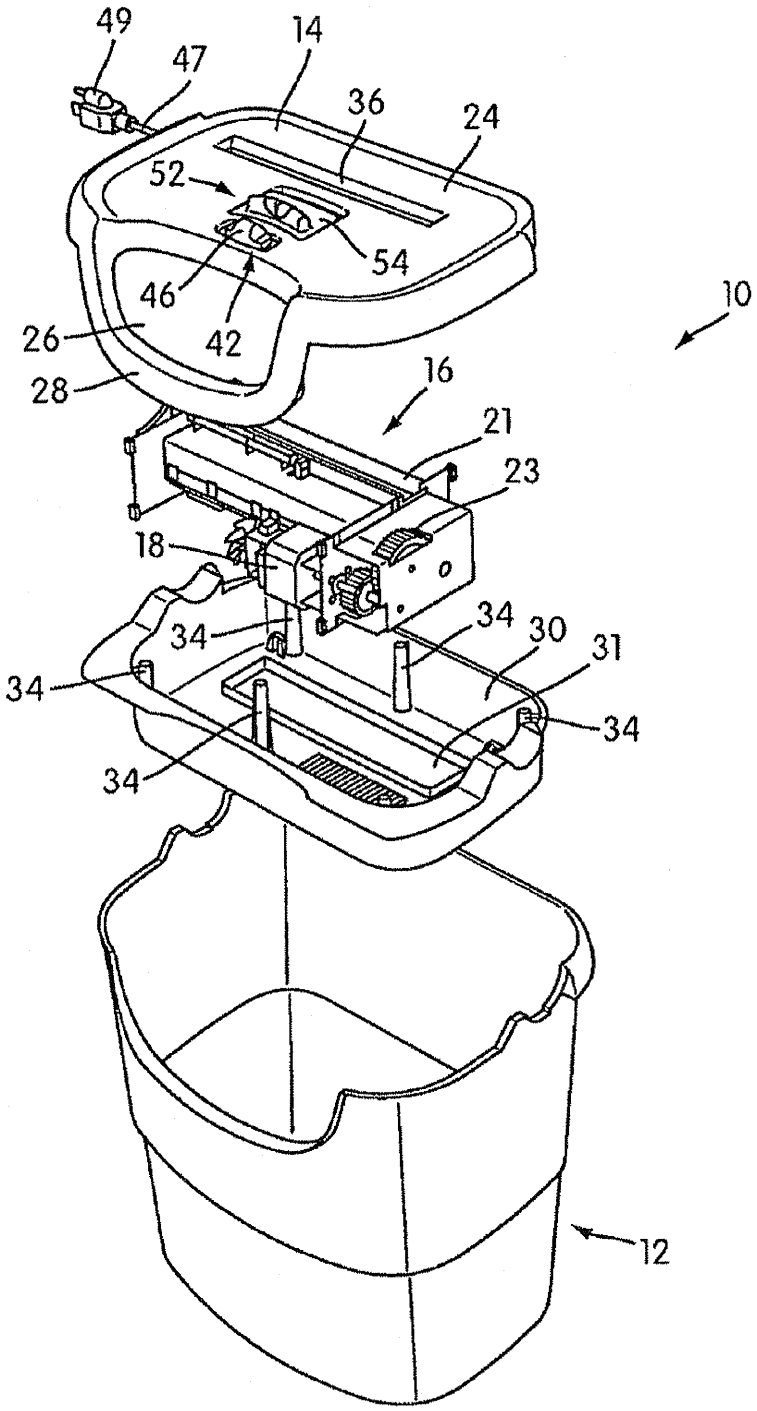


FIG. 1A

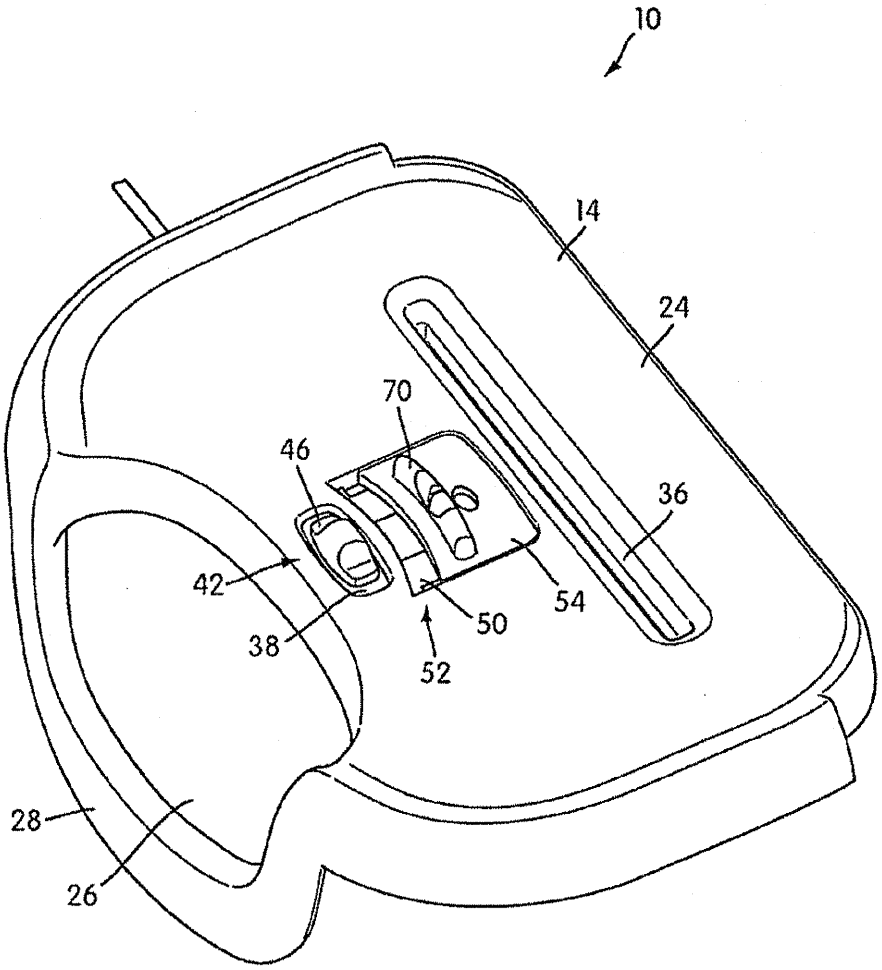


FIG. 2

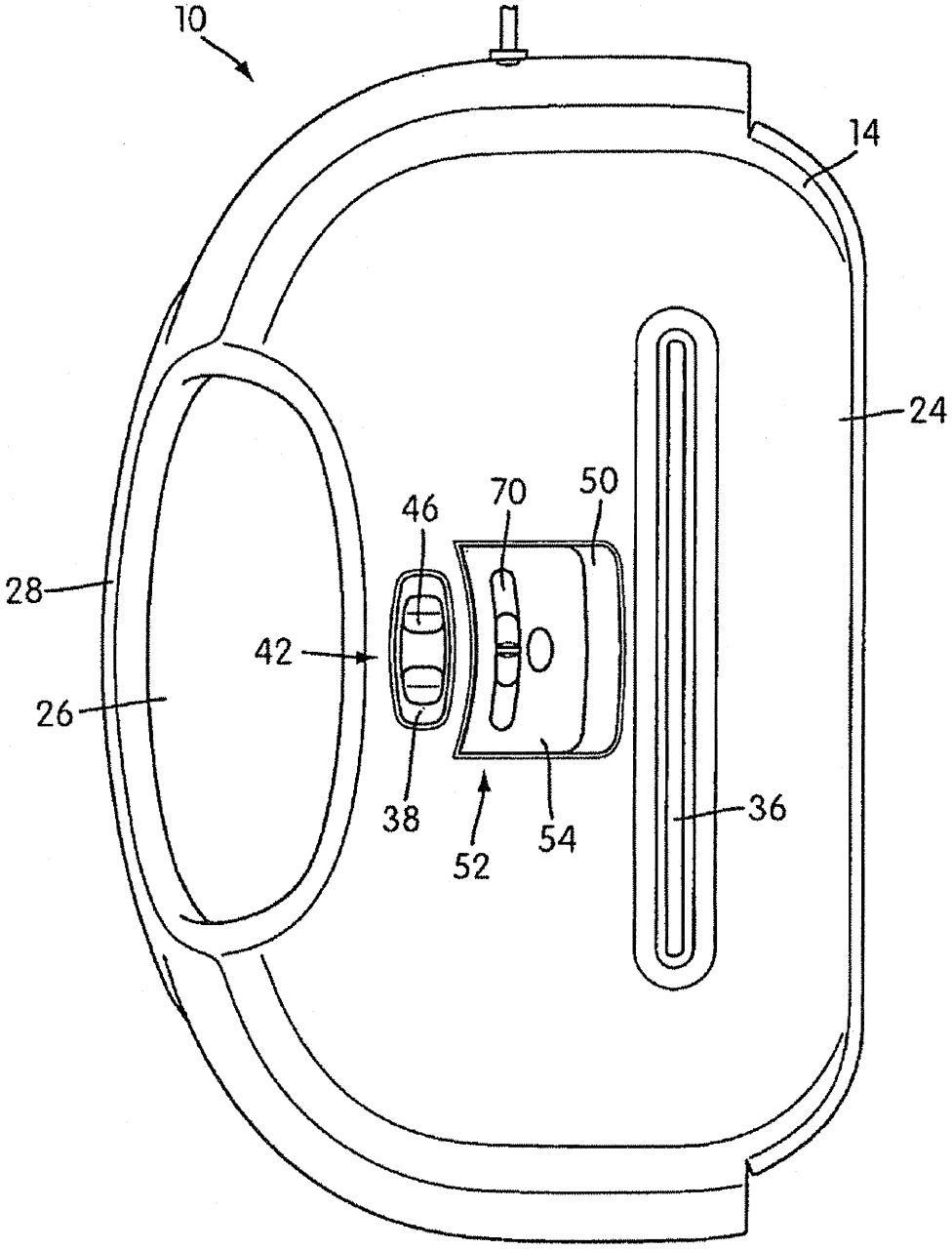


FIG. 3

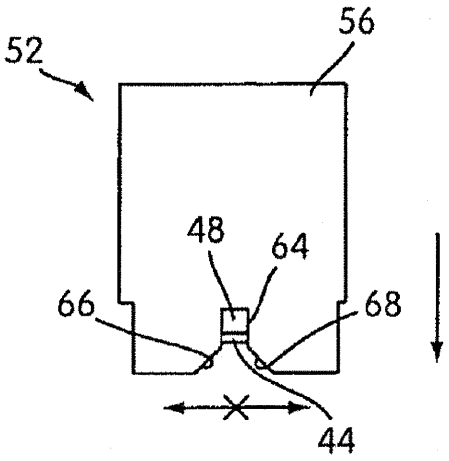


FIG. 4A

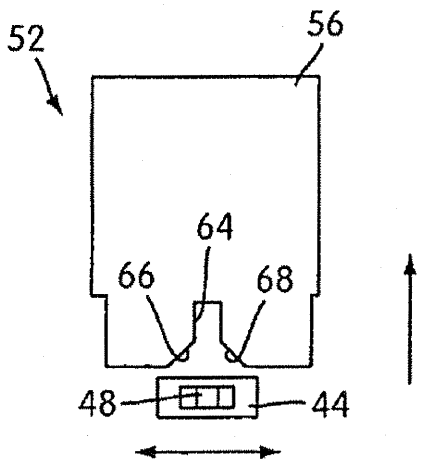


FIG. 4B

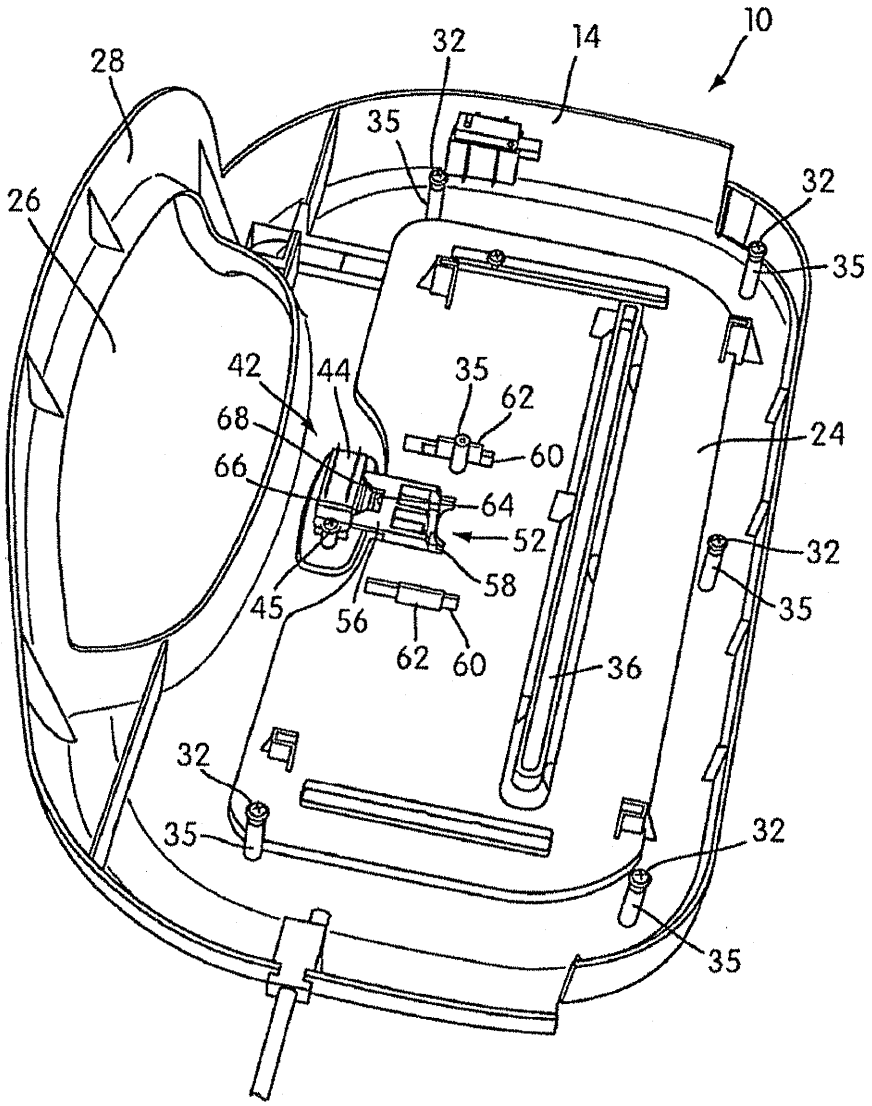

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FIG. 5

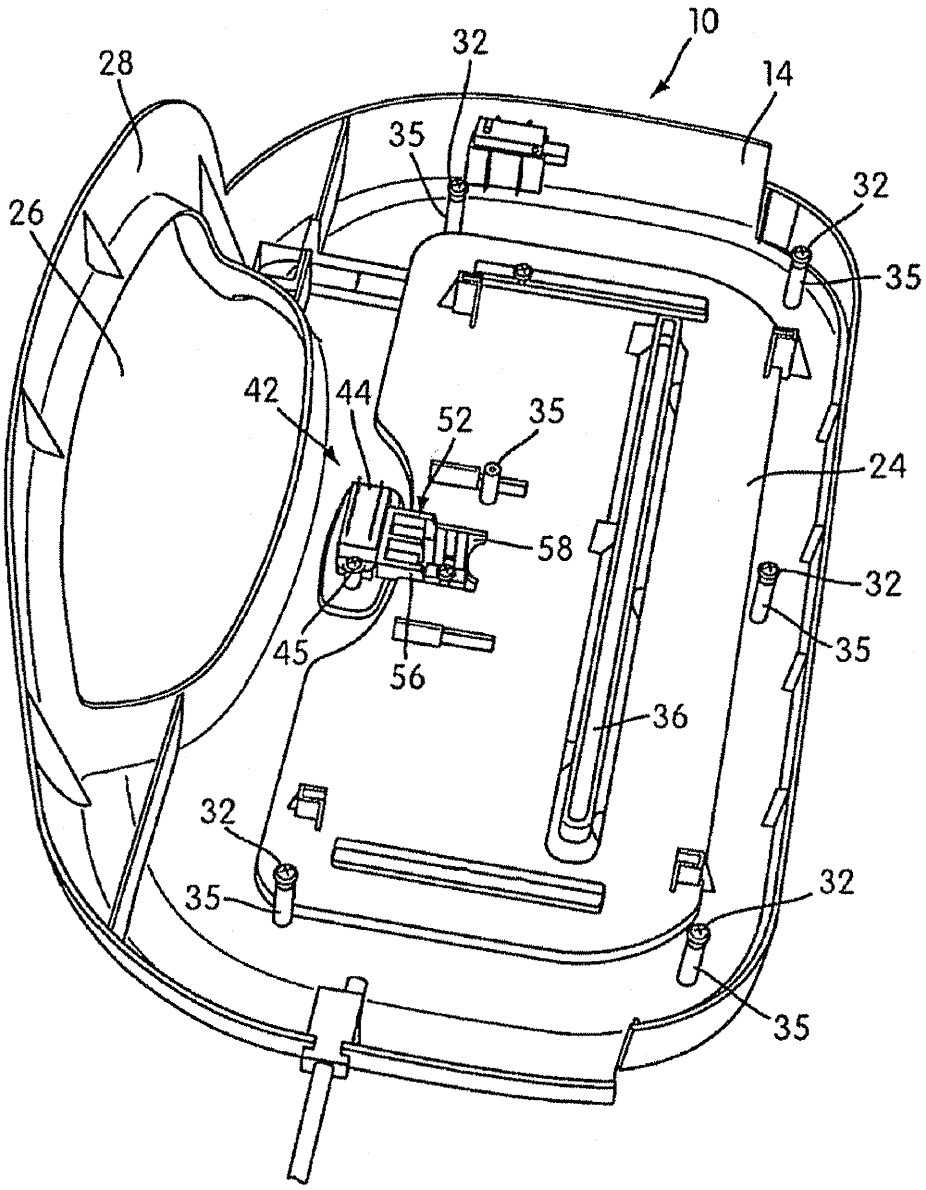


FIG. 6

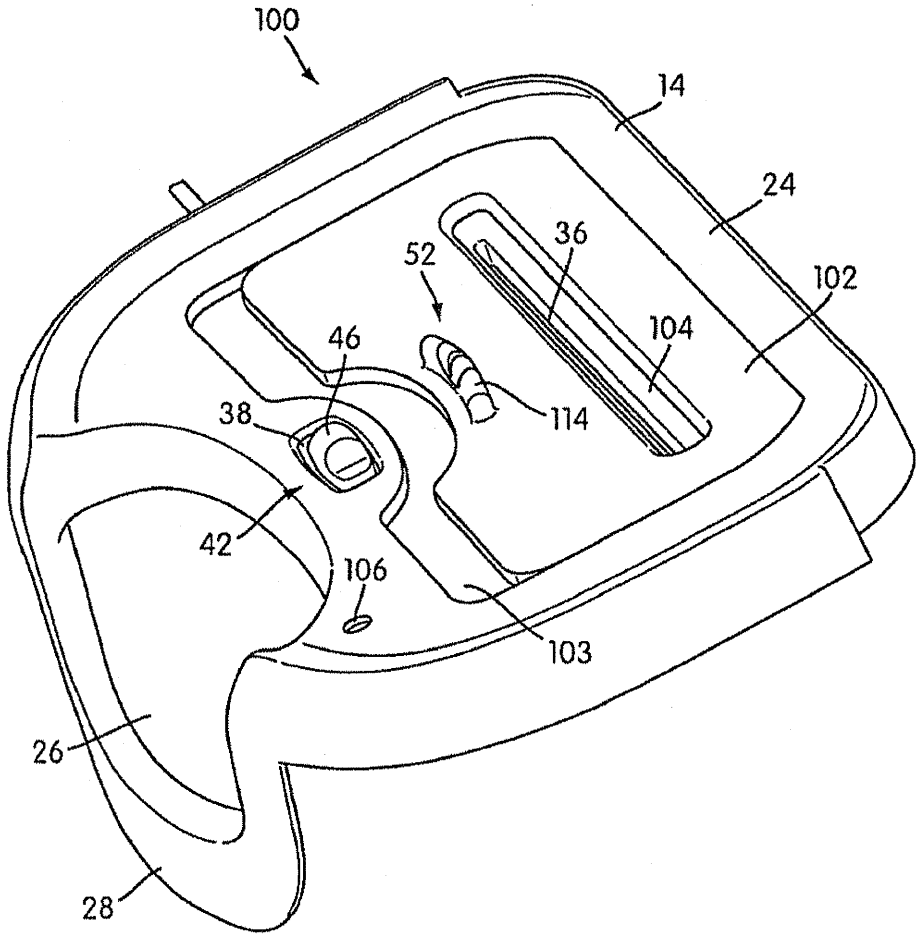


FIG. 7

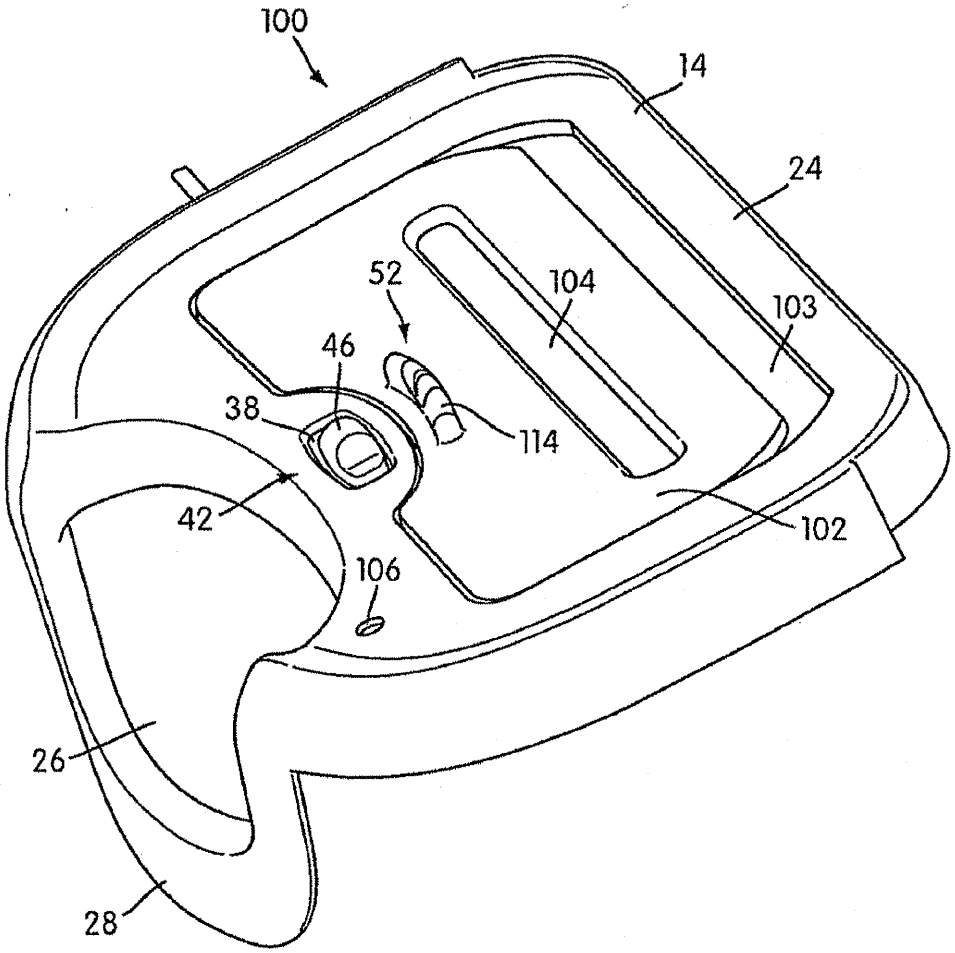


FIG. 8

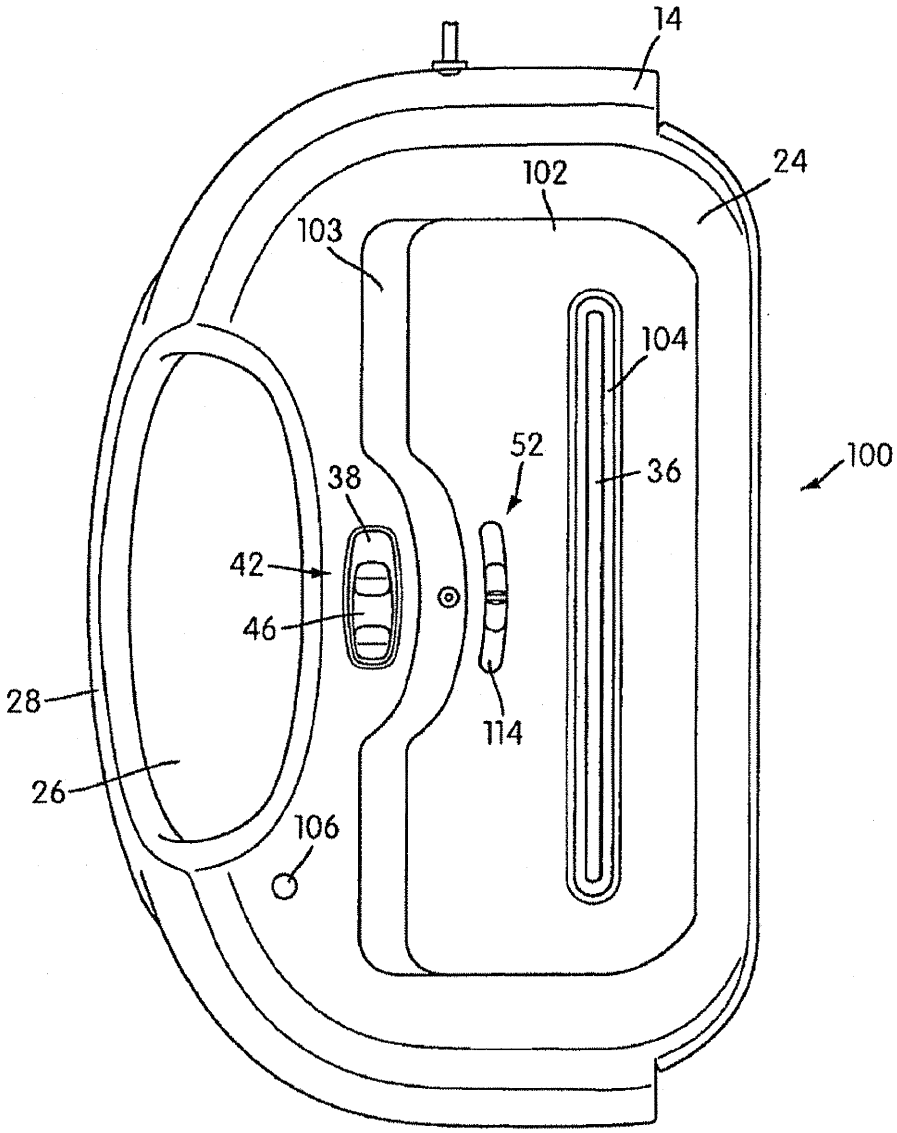


FIG. 9

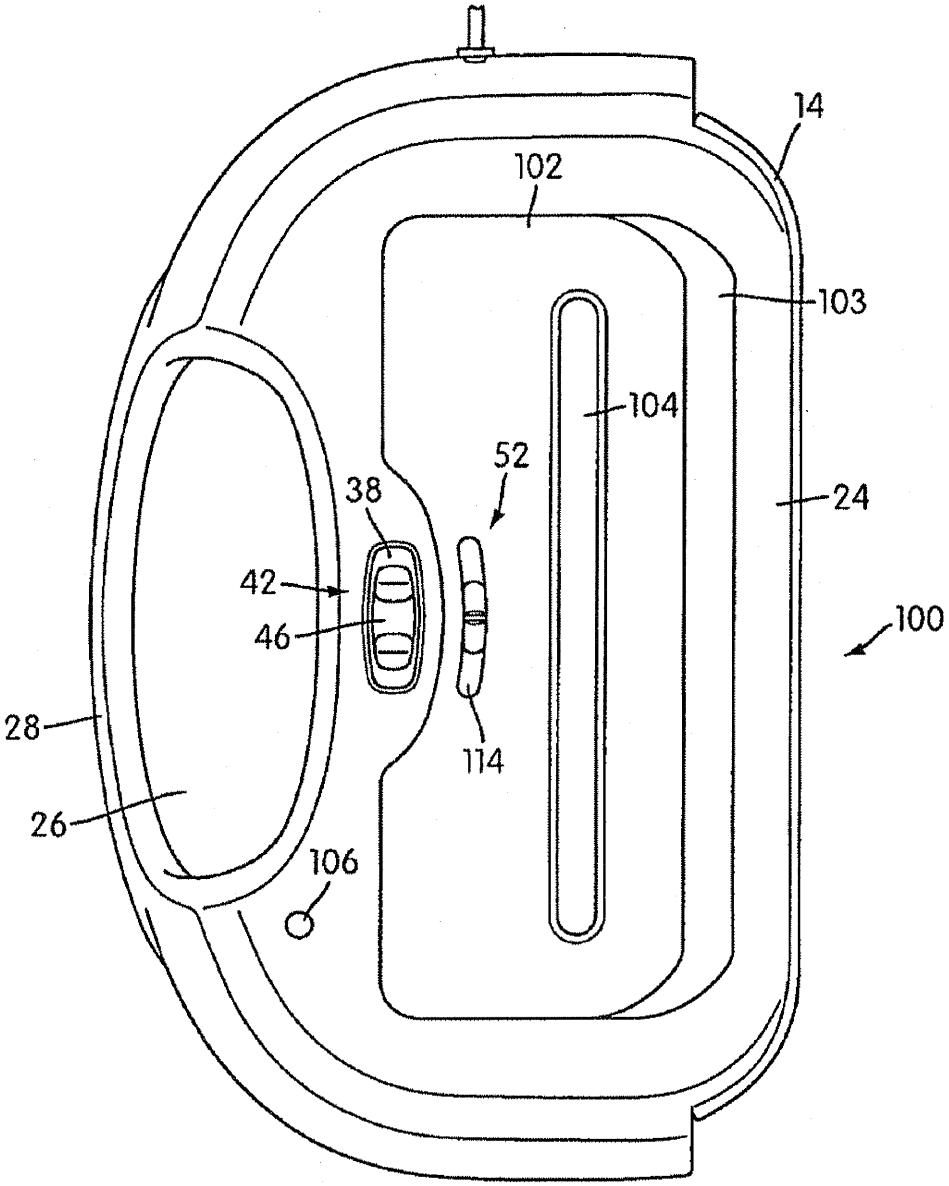


FIG. 10

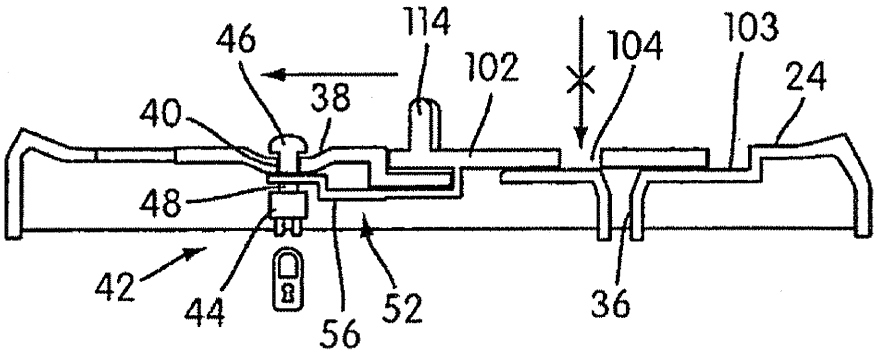


FIG. 11A

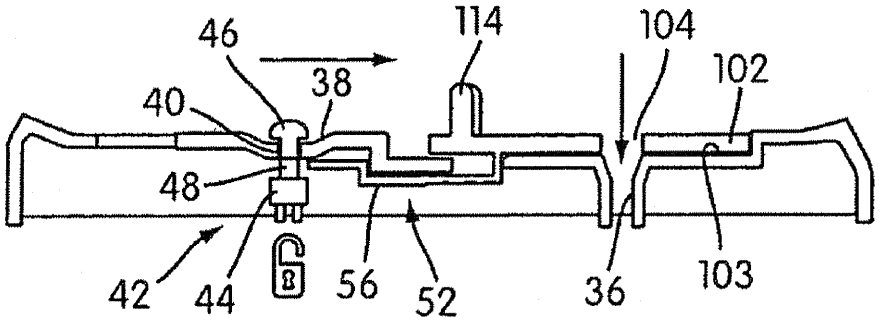


FIG. 11B

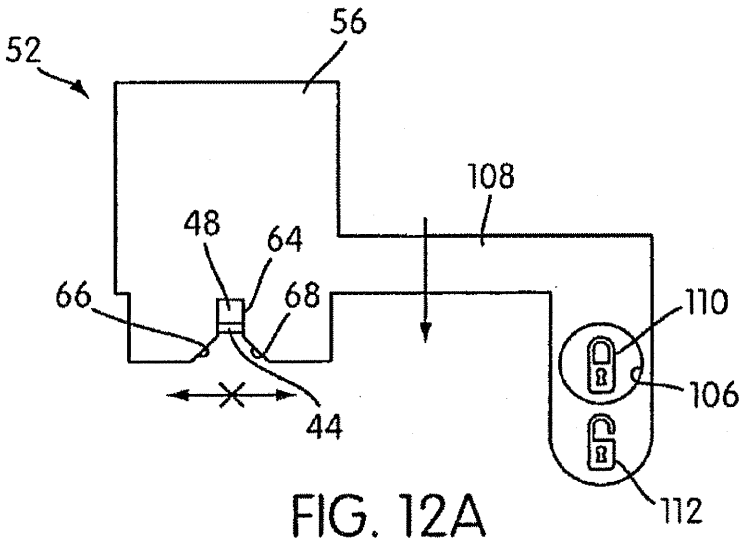


FIG. 12A

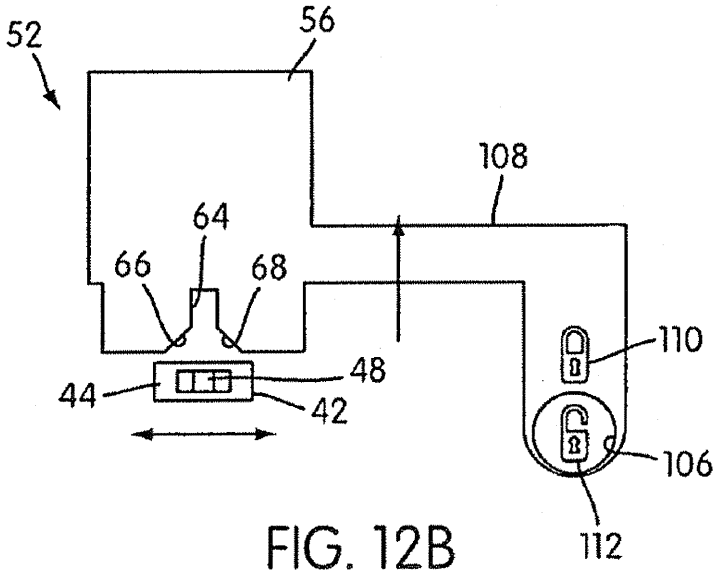


FIG. 12B

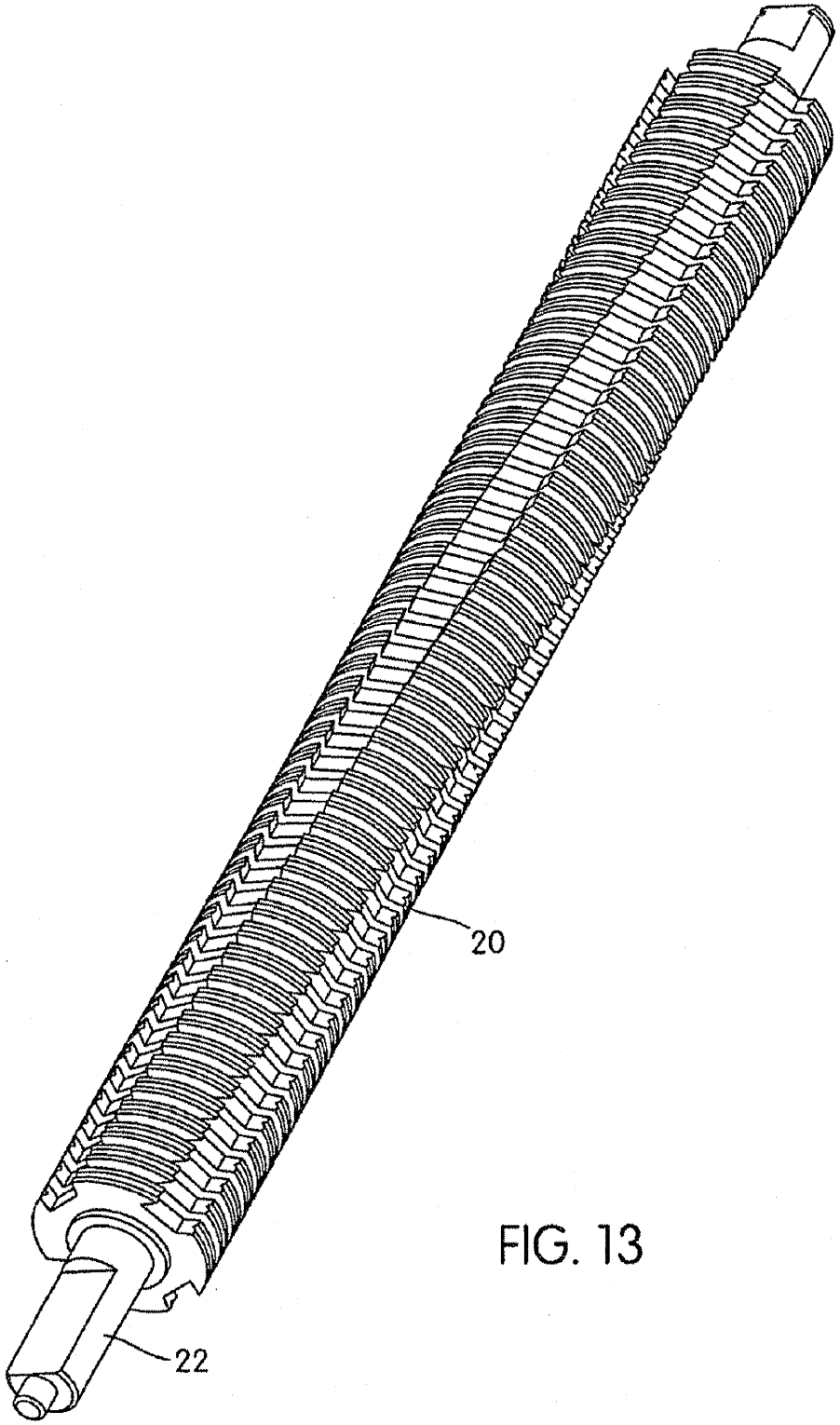


FIG. 13

SHREDDER WITH LOCK FOR ON/OFF SWITCH

FIELD OF THE INVENTION

The present invention relates to shredders for destroying articles, such as documents, CDs, floppy disks, etc.

BACKGROUND OF THE INVENTION

Shredders are well known devices used for shredding items, such as documents, CDs, floppy disks, etc. With identity theft, there has been an increased consumer awareness of the desirability of shredding documents containing sensitive personal information, such as credit card bills, tax documents bearing a person's Social Security number etc.

Shredders contain a series of cutting elements for shredding articles fed therein. Generally, it is desirable to prevent the inadvertent actuation of the motor driving the cutter elements. To this end, the present invention endeavors to provide a construction that has a reduced chance of being inadvertently actuated.

SUMMARY OF THE INVENTION

One aspect of the present invention provides a shredder with a switch lock that locks the on/off switch in its off position. Specifically, the shredder comprises a shredder mechanism including an electrically powered motor and cutter elements. The shredder mechanism enables articles to be shredded to be fed into the cutter elements. The motor is operable to drive the cutter elements so that the cutter elements shred the articles therein. The on/off switch is electrically coupled to the motor of the shredder mechanism. The switch includes a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor, and (b) an off position disabling the delivery of electric power to the motor. The switch lock is movable between (a) a locking position wherein the switch is locked in the off position, and (b) a releasing position wherein the switch is released for movement from the off position.

Other objects, features, and advantages will become appreciated from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a shredder seated atop a container with a switch lock thereof in a locking position;

FIG. **1**A is a perspective exploded view of the shredder of FIG. **1**;

FIG. **2** is a perspective view of the shredder of Figure without the container and with the switch lock in the releasing position thereof;

FIG. **3** is a top plan view of the shredder of FIG. **1** without the container and with the switch lock in the locking position;

FIG. **4**A is a top plan view showing the switch lock, an on/off switch of the shredder in isolation from the remainder of the shredder with the switch lock in the locking position;

FIG. **4**B is a view similar to FIG. **4**A, but with the switch lock in the releasing position;

FIG. **5** is a bottom perspective view of the shredder of FIG. **1** with the shredder unit mechanism removed and the switch lock in the releasing position;

FIG. **6** is a view similar to FIG. **5** with the switch lock in the locking position;

FIG. **7** is a perspective view of an alternative embodiment of a shredder with the container omitted, wherein the switch lock and throat cover move together, with the switch lock in the releasing position and the throat cover in the open position;

FIG. **8** is a perspective view similar to FIG. **7**, but with the switch lock in the locking position and the throat cover in the closed position;

FIG. **9** is a top plan view of the shredder of FIG. **7** with the switch lock in the releasing position and the throat cover in the open position;

FIG. **10** is a top plan view similar to FIG. **9**, but with the switch lock in the locking position and the throat cover in the closed position;

FIG. **11**A is a vertical cross-section taken through the front to back centerline of the shredder of FIG. **7** with the shredder mechanism removed and with the switch lock in the locking position and the throat cover in the closed position;

FIG. **11**B is a view similar to FIG. **11**A, but with the switch lock in the releasing position and the throat cover in the open position;

FIG. **12**A is a top plan view showing the switch lock, the on/off switch of the shredder, a switch lock indicator and an indicator window of the shredder housing in isolation from the remainder of the shredder with the switch lock in the locking position;

FIG. **12**B is a view similar to FIG. **12**A, but with the switch lock in the releasing position; and

FIG. **13** is a perspective view of a shaft with a plurality of cutter elements.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT(S) OF THE INVENTION

FIGS. **1–6** illustrate an embodiment of a shredder constructed in accordance with one embodiment of the present invention. The shredder is generally indicated at **10**. The shredder **10** sits atop a waste container, generally indicated at **12**. The shredder **10** illustrated is designed specifically for use with the container **12**, as the shredder housing **14** sits on the upper periphery of the waste container **12** is a nested relation. However, the shredder **10** may be of the type provided with an adaptable mount for attachment to a wide variety of containers. Generally speaking, the shredder **10** may have any suitable construction or configuration and the illustrated embodiment is not intended to be limiting in any way.

The shredder **10** includes a shredder mechanism **16** including an electrically powered motor **18** and a plurality of cutter elements **20**. The cutter elements **20** are mounted on a pair of parallel rotating shafts **22** in any suitable manner, and an example of a shaft **22** with cutter elements **20** is illustrated in FIG. **13**. The motor **18** operates using electrical power to rotatably drive the shafts **22** and the cutter elements **20** through a conventional transmission **23** so that the cutter elements **20** shred articles fed therein. The shredder mechanism **16** also may include a sub-frame **21** for mounting the shafts **22**, the motor **18**, and the transmission **23**. The operation and construction of such a shredder mechanism **16** are well known and need not be described herein in detail. Generally, any suitable shredder mechanism **16** known in the art or developed hereafter may be used.

The shredder **10** also includes the shredder housing **14**, mentioned above. The shredder housing **14** includes top wall **24** that sits atop the container **12**. The top wall **14** is molded from plastic and has an opening **26** near the front thereof, which is formed in part by a downwardly depending generally U-shaped member **28**. The opening **26** allows waste to be discarded into the container **12** without being passed through the shredder mechanism **16**, and the member **28** may act as a handle for carrying the shredder **10** separate from the container **12**. As an optional feature, this opening **26** may be provided with a lid, such as a pivoting lid, that opens and closes the opening **26**. However, this opening in general is optional and may be omitted entirely. Moreover, the shredder housing **14** and its top wall **24** may have any suitable construction or configuration.

The shredder housing **14** also includes a bottom receptacle **30** having a bottom wall, four side walls, and an open top. The shredder mechanism **16** is received therein, and the receptacle **30** is affixed to the underside of the top wall **24** by fasteners **32** inserted through bores in posts **34** on the receptacle **30** and engaged with corresponding bores in posts **35** (see FIGS. **5** and **6**). The receptacle **30** has a downwardly facing opening **31** for permitting shredded articles to be discharged from the shredder mechanism **16** into the container **12**.

The top wall **24** has a generally laterally extending opening **36** extending generally parallel and above the cutter elements **20**. The opening **36**, often referred to as a throat, enables the articles being shredded to be fed into the cutter elements **20**. As can be appreciated, the opening **36** is relatively narrow, which is desirable for preventing overly thick items, such as large stacks of documents, from being fed into cutter elements **20**, which could lead to jamming. The opening **36** may have any configuration.

The top wall **24** also has a switch recess **38** with an opening **40** therethrough. An on/off switch **42** includes a switch module **44** (FIGS. **4A–6**) mounted to the top wall **24** underneath the recess **38** by fasteners **45**, and a manually engageable portion **46** that moves laterally within the recess **38**. The switch module **44** has a movable element **48** that connects to the manually engageable portion **46** through the opening **40**. This enables movement of the manually engageable portion **46** to move the switch module between its states.

In the illustrated embodiment, the switch module **44** connects the motor **18** to the power supply (not shown). Typically, the power supply will be a standard power cord **47** with a plug **49** on its end that plugs into a standard AC outlet, but any suitable manner of power delivery may be used. The switch **42** is movable between an on position and an off position by moving the portion **46** laterally within the recess **38**. In the on position, contacts in the switch module **44** are closed by movement of the manually engageable portion **46** and the movable element **48** to enable a delivery of electrical power to the motor **18**. In the off position, contacts in the switch module **44** are opened to disable the delivery of electric power to the motor **18**.

As an option, the switch **42** may also have a reverse position wherein contacts are closed to enable delivery of electrical power to operate the motor **18** in a reverse manner. This would be done by using a reversible motor and applying a current that is of a reverse polarity relative to the on position. The capability to operate the motor **18** in a reversing manner is desirable to move the cutter elements **20** in a reversing direction for clearing jams. In the illustrated embodiment, in the off position the manually engageable portion **46** and the movable element **48** would be located generally in the center of the recess **38**, and the on and reverse positions would be on opposing lateral sides of the off position.

Generally, the construction and operation of the switch **42** for controlling the motor **42** are well known and any construction for such a switch **42** may be used.

The top cover **24** also includes another recess **50** associated with a switch lock **52**. The switch lock **52** includes a manually engageable portion **54** that is movable by a user's hand and a locking portion **56** (FIGS. **4A–6**). The manually engageable portion **54** is seated in the recess **50** and the locking portion **56** is located beneath the top wall **24**. The locking portion **56** is illustrated as being integrally formed as a plastic piece with the manually engageable portion **54** and extends beneath the top wall **24** via an opening **58** formed in the recess **50**.

The recess **50** also has a pair of slots **60** on the opposing lateral sides thereof. The manually engageable portion **54** has resilient catch members **62** with flared ends that are inserted into these slots **60** so as to securely mount the switch lock **52** for sliding movement within the recess **50**.

The switch module **44** is mounted so as to define a small space between it and the underside of the top wall **24**. The movable element **48** of the switch **42** extends through this space. The locking portion **56** of the switch lock **52** has a switch receiving recess **64** with a pair of angled camming surfaces **66**, **68** on opposing sides thereof. This construction causes the switch **42** to move from either its on position or reverse position to its off position as the switch lock **52** is moved from a releasing position to a locking position. In the releasing position, the locking portion **56** is disengaged from the movable element **48** of the switch **42**, thus enabling the switch **42** to be moved between its on, off, and reverse positions. In the locking position, the switch lock **52** extends into the space between the module **44** and the top wall **24** so that the movable element **48** is received in its off position in the recess **64** and restrained against movement to either its on or reverse position.

The camming surfaces **66**, **68** are provided to move the switch **42** to its off position as the switch lock **52** is moved from its releasing position to its locking position. Specifically, when the switch **42** is in the on position, cam surface **66** will engage the movable element **48** of the switch **42** and cam the same so as to move the switch **42** into the off position with the movable element **48** thereafter restrained against movement from its off position. Likewise, when the switch **42** is in the reverse position, cam surface **68** will engage the movable element **48** and cam the same so as to move the switch **42** to the off position with the movable element **48** thereafter restrained from movement from its off position. FIGS. **4A–6** best illustrate these features of this embodiment of the invention.

In embodiments where the switch **42** has no reverse position, the corresponding cam surface **68** may be omitted. Also, the switch lock **52** may be constructed to move the switch **42** from the on and/or reverse position to the off position as the switch lock **52** moves from the releasing position to the locking position by any suitable arrangement, and the cam surface(s) are not intended to be limiting. For example, mechanical links or other structures may be used. Moreover, it is not necessary to have the switch lock **52** move the switch **42** into its off position. Instead, the switch lock **52** could be constructed so that the switch **42** is manually moved to its off position prior to moving the switch lock **52** to its locking position.

Preferably, but not necessarily, the manually engageable portion **54** of the switch lock **52** has an upwardly extending

projection **70** for facilitating movement of the switch lock **56** between the locking and releasing positions.

One advantage of the switch lock **52** is that, by holding the switch **42** in the off position, to activate the shredder mechanism **16** the switch lock **52** must first be moved to its releasing position, and then the switch **42** is moved to its on or reverse position. This reduces the likelihood of the shredder mechanism **16** being activated unintentionally.

FIGS. **7–11**B illustrate another embodiment of a shredder **100**. This shredder **100** shares many common features with the shredder **10** of the first embodiment, and those common features are marked with the same reference numerals.

The primary difference between shredder **10** and shredder **100** is the cover **102**. The cover **102** is seated within a recess **103** formed in the top wall **24** and can move between open and closed positions. In the closed position, the cover **102** covers the opening **36** to prevent articles from being fed into the housing **14** and into the cutter elements **20**. In the open position, the cover **102** uncovers the opening **36** to allow the articles to be shredded to be fed into the housing **14** and into the cutter elements **20**. Specifically, the cover **102** has an opening **104** shaped similarly to opening **36**. In the open position, these openings **36**, **104** are aligned to enable feeding of articles through the openings **36**, **104** and into the cutter elements **20**. In the closed position, these openings **36**, **104** are out of alignment, thus preventing such feeding of articles into the cutter elements **20**.

In this embodiment, switch lock **52** is integrated as a molded part with the cover **102**. Basically, the manually engageable portion **54** illustrated in the previous embodiment is eliminated and the locking portion **56** is formed integrally with the cover **102** (see FIGS. **11**A and **11**B). As a result, the cover **102** and the switch lock (i.e., locking portion **56**) move together between (a) the open position of the cover **102** and the releasing position of the switch lock **52**, and (b) the closed position of the cover **102** and the locking position of the switch lock **52**.

As a result of this construction, if the switch **42** is left in the on or reverse position, the user can simply move the cover **102** to its closed position to simultaneously close the opening **36** and move the switch **42** to its off position by the camming action of locking portion **56** moving to its locking position. Of course, if the locking portion **56** is of the type where it does not move the switch **42** to its off position as during movement to the locking position, then the user would first move the switch **42** to its off position. In either case, to use the shredder, the user first moves the cover **102** to its open position, which simultaneously moves the locking portion **56** to its releasing position. Then, the switch **42** can be moved to the on position (or the reverse position if needed).

The switch lock **52** and the cover **102** need not be linked by being integrally formed together as one piece, and they could be formed separately and linked together for movement in any suitable way. Also, the cover **102** could be independent from the switch lock **52**, with the same type of switch lock being used as is used in the first embodiment.

The cover **102** also has an upwardly extending ridge **114** for facilitating movement of the cover **102** and the switch lock **52**.

In the second embodiment illustrated, the top wall **24** also has an indicator window **106**. The window **106** may simply be an opening **106**, or it may have a transparent/translucent member therein. An arm **108** is formed integrally with the locking portion **56** and extends therefrom. The end of the arm **108** carries a locked indicator **110** and an unlocked indicator **112**. The locked indicator **110** has the appearance of a locked padlock, and the unlocked indicator **110** has the appearance of an unlocked padlock. When the cover **102** is in the closed position and the switch lock **52** provided by locking portion **56** is in the locking position, the locked indicator **110** is located beneath the indicator window **106**, enabling the user to visually see the locked indicator **100** and tell that the on/off switch **42** is locked in the off position (FIG. **12**A). Likewise, when the cover **102** is in the open position and the switch lock **52** is in the releasing position, the unlocked indicator **112** is positioned beneath the window **106**, enabling the user to visually see the unlocked indicator **112** and tell that the on/off switch **42** is freely movable (FIG. **12**B).

Generally, this construction may be considered as providing a status indicator that visually indicates to the user whether the switch lock **52** is in the locking position. As one variation, the unlocked indicator **112** could be eliminated, providing only the locked indicator **110** to indicate that the switch lock **52** is in its locked position, with the locked indicator's absence in the window **106** indicating that switch lock **52** is in its releasing position. As another variation, one or more LEDs or other type of light may be used to indicate whether the switch lock **52** is in the locking position. Any other suitable device may be used to indicate the status of the switch lock and the examples herein should not be considered limiting.

The foregoing embodiments have been provided solely for the purposes of illustrating the structural and functional principles of the present invention, and should not be considered limiting. To the contrary, the present invention is intended to encompass all variations, modifications, and alterations within the spirit and scope of the appended claims.

What is claimed is:

1. A shredder comprising:

a housing;

a shredder mechanism mounted in the housing and including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch provided on an exterior of the housing and electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion provided on the exterior of the housing, the manually engageable portion being manually movable by the user's hand to move the switch lock between the locking and releasing positions.

2. A shredder according to claim **1**, wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

3. A shredder according to claim 2, wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the of position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

4. A shredder according to claim 3, wherein the switch lock includes a pair of camming surfaces, one of the camming surfaces being configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position, the other of the camming surfaces being configured to cam the switch from the reverse position to the off position as the switch lock moves from the releasing position to the locking position.

5. A shredder according to claim 2, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position.

6. A shredder according to claim 1, further comprising a cover associated with the throat opening of the housing, the cover being movable between (a) a closed position covering the opening for preventing the articles to be shredded from being fed into the housing and into the cutter elements, and (b) an open position uncovering the opening for allowing the articles to be shredded to be fed into the housing and into the cutter elements.

7. A shredder according to claim 6, wherein the cover is linked with the switch lock such that the cover and the switch lock move together between (a) the open position of the cover and the releasing position of the switch lock and (b) the closed position of the cover and the locking position of the switch lock.

8. A shredder according to claim 7, wherein the cover is manually movable between the open and closed positions thereof, thereby enabling manual movement of the cover between the open and closed positions to move the switch lock between the releasing and locking positions thereof, respectively.

9. A shredder according to claim 8, wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

10. A shredder according to claim 9, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position. operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position, p1 wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

11. A shredder according to claim 9, wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

12. A shredder according to claim 11, wherein the switch lock includes a pair of camming surfaces, one of the camming surfaces being configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position, the other of the camming surfaces being configured to cam the switch from the reverse position to the off position as the switch lock moves from the releasing position to the locking position.

13. A shredder according to claim 1, comprising a status indicator for visually indicating whether the switch lock is in the locking position.

14. A shredder according to claim 1, wherein the housing has an upwardly facing top wall, and wherein the throat opening is formed in the top wall.

15. A shredder according to claim 14, wherein the manually engageable portion of the on/off switch is mounted for sliding movement on the top wall between the on and off positions thereof.

16. A shredder according to claim 15, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion of the on/off switch is received in said recess.

17. A shredder according to claim 15, wherein the manually engageable portion of the switch lock is mounted for sliding movement on the top wall between the locking and releasing positions thereof.

18. A shredder according to claim 17, wherein the switch lock has a locking portion located beneath the top wall and connected to the manually engageable portion of the switch lock, the locking portion being constructed to engage a portion of the switch beneath the top wall in the locking position of the switch lock to lock the on/off switch in the off position.

19. A shredder according to claim 18, wherein the on/off switch has a switch module located beneath the top wall and connected to the motor for controlling the delivery of electrical power to the motor;

the on/off switch further comprising a movable element located at least in part beneath the top wall and connecting the manually engageable portion of the on/off switch to the switch module;

the locking portion of the switch lock being constructed to engage the movable element of the on/off switch beneath the top wall in the locking position of the switch lock to lock the on/off switch in the off position.

20. A shredder according to claim 19, wherein a space is provided beneath the top wall between the switch module and the top wall, the movable element of the on/off switch extending in said space and the locking portion of the switch lock being movable within said space to engage the movable element in the locking position of the switch lock to lock the on/off switch in the off position.

21. A shredder according to claim 20, wherein the locking portion of the switch lock includes a recess, the recess being configured to receive the movable element of the switch in the locking position of the switch lock to lock the on/off switch in the locking position.

22. A shredder comprising:

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter

elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

an on/off switch electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

a housing in which the shredder mechanism is received, the housing including an opening for enabling the articles to be shredded to be fed into the housing and into the cutter elements;

a cover associated with the opening of the housing, the cover being movable between (a) a closed position covering the opening for preventing the articles to be shredded from being fed into the housing and into the cutter elements, and (b) an open position uncovering the opening for allowing the articles to be shredded to be fed into the housing and into the cutter elements;

wherein the cover is linked with the switch lock such that the cover and the switch lock move together between (a) the open position of the cover and the releasing position of the switch lock and (b) the closed position of the cover and the locking position of the switch lock.

23. A shredder according to claim **22**, wherein the cover is manually movable between the open and closed positions thereof, thereby enabling manual movement of the cover between the open and closed positions to move the switch lock between the releasing and locking positions thereof, respectively.

24. A shredder according to claim **23**, wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

25. A shredder according to claim **24**, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position.

26. A shredder according to claim **24**, wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

27. A shredder according to claim **26**, wherein the switch lock includes a pair of camming surfaces, one of the camming surfaces being configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position, the other of the camming surfaces being configured to cam the switch from the reverse position to the off position as the switch lock moves from the releasing position to the locking position.

28. A shredder comprising:

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

an on/off switch electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion manually movable by the user's hand to move the switch lock between the locking and releasing positions;

wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position;

wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position;

wherein the switch lock includes a pair of camming surfaces, one of the camming surfaces being configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position, the other of the camming surfaces being configured to cam the switch from the reverse position to the off position as the switch lock moves from the releasing position to the locking position.

29. A shredder comprising:

a housing;

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch provided on an exterior of the housing and electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion provided on the exterior of the housing, the manually engageable portion being manually movable by the user's hand to move the switch lock between the locking and releasing positions; and

wherein the switch lock is constructed such that, when the on/off switch is in the on position thereof, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

30. A shredder according to claim **29**, wherein the switch lock includes a camming surface configured to cam the switch from the on position to the off position as the switch lock moves from the releasing position to the locking position.

31. A shredder according to claim **30**, wherein the switch is also movable to a reverse position enabling delivery of electric power to the motor so as to operate the motor to drive the cutter elements in a reverse manner, the on position and the reverse position being on opposing sides of the off position,

wherein the switch lock is also constructed such that, when the on/off switch is in the reverse position, moving the switch lock from the releasing position to the locking position causes the switch to move into the off position.

32. A shredder according to claim **31**, wherein the housing has an upwardly facing top wall, wherein the throat opening is formed in the top wall, and wherein the manually engageable portion of the switch lock is mounted for linear sliding movement on the top wall between the on and off positions thereof.

33. A shredder according to claim **32**, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion is received in said recess.

34. A shredder comprising:

a housing;

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch provided on an exterior of the housing and electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion provided on an exterior of the housing, the manually engageable portion being manually movable by the user's hand to move the switch lock between the locking and releasing positions; and

a status indicator provided on the exterior of the housing for visually indicating whether the switch lock is in the locking position.

35. A shredder according to claim **34**, wherein the housing has an upwardly facing top wall, wherein the throat opening is formed in the top wall, and wherein the manually engageable portion of the switch lock is mounted for linear sliding movement on the top wall between the on and off positions thereof.

36. A shredder according to claim **35**, wherein the top wall has an open, upwardly facing recess and wherein the manually engageable portion is received in said recess.

37. A shredder comprising:

a housing;

a shredder mechanism including an electrically powered motor and cutter elements, the shredder mechanism enabling articles to be shredded to be fed into the cutter elements and the motor being operable to drive the cutter elements so that the cutter elements shred the articles fed therein;

a throat opening provided on the housing for enabling articles to be fed into the shredder mechanism;

an on/off switch provided on an exterior of the housing and electrically coupled to the motor of the shredder mechanism, the switch including a manually engageable portion manually movable by a user's hand between at least (a) an on position wherein the switch enables delivery of electric power to the motor and (b) an off position disabling the delivery of electric power to the motor;

a switch lock movable between (a) a locking position wherein the switch is locked in the off position and (b) a releasing position wherein the switch is released for movement from the off position;

wherein the switch lock includes a manually engageable portion provided on an exterior of the housing, the manually engageable portion being manually movable by the user's hand to move the switch lock between the locking and releasing positions; and

the switch lock including a locking portion connected to the manually engageable portion of the switch lock, the locking portion including a recess configured to receive a portion of the on/off switch in the locking position of the switch lock to lock the on/off switch in the off position.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,040,559 B2
APPLICATION NO. : 10/815761
DATED : May 9, 2006
INVENTOR(S) : Matlin et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

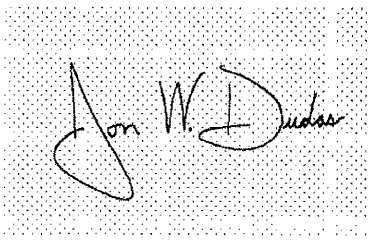
Column 7, line 5 is amended to read:

--and the reverse position being on opposing sides of the off--.

Column 7, line 55, after the word --position.--, please delete the remainder of the claim.

Signed and Sealed this

First Day of August, 2006



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Director of the United States Patent and Trademark Office